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NATIONAL ENERGY SECURITY ACT OF 1991

(Subtitle A of Title XI)

HEARINGS

BEFORE THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

ONE HUNDRED SECOND CONGRESS

FIRST SESSION

ON

S. 341

TO REDUCE THE NATION'S DEPENDENCE ON IMPORTED OIL, TO PROVIDE FOR THE ENERGY SECURITY OF THE NATION AND FOR OTHER PURPOSES

FEBRUARY 28 AND MARCH 20, 1991

PART 4

Printed for the use of the
Committee on Energy and Natural Resources

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NATIONAL ENERGY SECURITY ACT OF 1991

(Subtitle A of Title XI)

THURSDAY, FEBRUARY 28, 1991

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:34 a.m. in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, U.S. SENATOR FROM LOUISIANA

The CHAIRMAN. The hearing will come to order.

The CAFE standards constitute an important part of our legislation. Much of the public and many members of Congress support an increase in CAFE standards. Many argue that the design of the standards should also be changed. The design of CAFE standards involves difficult policy choices concerning fuel savings, consumer preferences, size, performance, safety, employment, and a host of other factors.

Congress can go down one of two roads in CAFE policy. It can, on the one hand, simply pick a number that sounds tough with regard to CAFE standards and say, do it. Or it can undertake the difficult process of evaluating these policy choices and determining the new CAFE standard after an explicit and well-informed debate.

S. 341 proposes to go down the second road, to pick the criteria and debate the criteria, rather than to simply pick a number without explicit knowledge of where those numbers would lead in terms of criteria, performance, size, customer preference, effect on the American economy, and a host of other things.

Today we begin hearings on these CAFE standards, and we begin with an outstanding panel, which includes: Mr. Jerry Curry, Administrator of the National Highway Traffic Safety Administration; Steve Plotkin, who is Senior Associate of the Office of Technology Assessment, and with him is Mr. K.G. Duleep of Energy and Environmental Analysis, who as I understand, has the only computer model in the country and it is used by all sides in this debate, that will tell us where criteria lead in terms of miles per gallon or vice versa.

So let us begin this morning with Mr. Curry, who is the Administrator of National Highway Traffic Safety Administration.

[The prepared statement of Senator Johnston and the text of subtitle A of title XI follow:]

PREPARED STATEMENT OF HON. J. BENNETT JOHNSTON, U.S. SENATOR FROM LOUISIANA

A comprehensive national energy policy must address oil use in the transportation sector. Gasoline consumption accounts for over 40% of U.S. petroleum consumption (7 million barrels per day of a total of 17 million barrels per day). Even small improvements in energy efficiency in the transportation sector can have significant effects on oil consumption.

In the aftermath of the first oil crisis, Congress enacted Corporate Average Fuel Economy standards for automobiles. CAFE standards have been controversial from the beginning, but there is little doubt that they have been effective in increasing the fuel economy of new automobiles. Gasoline prices declined (in inflation-adjusted dollars) through most of the 1980's, yet average fuel economy generally increased. Clearly, CAFE standards helped improve auto efficiency during a time when one would have expected declines.

The trends in auto efficiency in recent years have been discouraging. The average efficiency of new cars has declined for the last two years, and the average efficiency of light trucks has decreased three years in a row. The total fleet average (cars and light trucks) has declined for the last three years, reflecting the individual declines in both vehicle classes as well as an increase in the market share of light trucks.

The time has come for a fresh look at the level and design of CAFE standards. Subtitle A of Title XI offers a workable alternative to the current CAFE standards, and it serves as a catalyst for an in-depth debate on the issues surrounding CAFE. I recognize that changes in CAFE standards involve difficult policy choices regarding fuel savings, consumer preferences, safety, and employment. These are tough policy choices ultimately affecting what kind of cars people are able to purchase. These choices, in turn, will help determine our dependence on oil for transportation and, ultimately, our dependence on imported oil.

Congress has two broad choices in CAFE policy: it can simply pick a number for the new CAFE standard that sounds "tough", or it can undertake the difficult process of evaluating these policy choices and determining the new CAFE standard after an explicit and well-informed debate. My preference is for the latter—the importance of the subject matter demands it.

We have distinguished panels of witnesses today, and I look forward to a spirited debate on the entire range of issues.

II

102D CONGRESS
1ST SESSION

S. 341

To reduce the Nation's dependence on imported oil, to provide for the energy security of the Nation and for other purposes.

IN THE SENATE OF THE UNITED STATES

FEBRUARY 5 (legislative day, JANUARY 3), 1991

Mr. JOHNSTON (for himself and Mr. WALLOP) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

---

A BILL

To reduce the Nation's dependence on imported oil, to provide for the energy security of the Nation and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be referred to as the "National Energy Security Act of 1991".

* * * * * * *

TITLE XI—TRANSPORTATION AND ALTERNATIVE FUELS

Subtitle A—Corporate Average Fuel Economy

SECTION 11001. SHORT TITLE.

This subtitle may be cited as the "Motor Vehicle Fuel Efficiency Act of 1991".

SEC. 11002. DEFINITIONS.

Section 501 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2001) is amended by adding at the end the following new paragraphs:

"(15) The term 'light truck' means an automobile other than a passenger automobile.

"(16) The term 'vehicle class' means (i) all passenger automobiles; (ii) all light trucks; or (iii) a class of light trucks as determined by the Secretary of Transportation under section 502(b)(4).".

SEC. 11003. AVERAGE FUEL ECONOMY STANDARDS FOR PASSENGER AUTOMOBILES.

Section 502(a) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(a)) is amended by striking subsection (a) and inserting the following:

"(a)(1) Except as otherwise provided in subsection (c), the average fuel economy for passenger automobiles manufactured by any manufacturer in any model year after model year 1984 shall not be less than the number of miles per gallon established for such model year under the following table:

"Model year	"Average fuel economy standard
"1985 through 1995	27.5 miles per gallon
"1996 through 2001	Determined by the Secretary under paragraph (2)(A)
"2002 and thereafter................	Determined by the Secretary under paragraph (2)(B)

"(2) Not later than July 1, 1992, the Secretary shall prescribe, by rule, for each manufacturer of passenger automobiles, average fuel economy standards for—

"(A) passenger automobiles manufactured by such manufacturer in model years 1996 through 2001; and

"(B) passenger automobiles manufactured by such manufacturer in model years 2002 and thereafter.

"(3) The average fuel economy standard prescribed by the Secretary for any manufacturer under paragraph (2)(A) or (B) shall be set at a level which the Secretary determines is the maximum feasible average fuel economy level for such manufacturer as determined under subsection (d).".

SEC. 11004. AVERAGE FUEL ECONOMY STANDARDS FOR LIGHT TRUCKS.

Section 502 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002) is amended further by striking subsection (b) and inserting the following:

"(b)(1) The Secretary shall, by rule, prescribe average fuel economy standards for light trucks which are manufactured by any manufacturer in each model year before model year 1996. Such standards shall be set at a level which the Secretary determines is the maximum feasible average fuel economy level which such manufacturers are able to achieve in each model year to which this subsection applies. Any standard applicable to a model year under this subsection shall be prescribed at least 18 months prior to the beginning of such model year.

"(2) Not later than July 1, 1992, the Secretary shall prescribe, by rule, for each manufacturer of light trucks, average fuel economy standards for—

"(A) light trucks manufactured by such manufacturer in model years 1996 through 2001; and

"(B) light trucks manufactured by such manufacturer in model years 2002 and thereafter.

"(3) The average fuel economy standard prescribed by the Secretary for any manufacturer under paragraph (2)(A) or (B) shall be set at a level which the Secretary determines is the maximum feasible average fuel economy level for such manufacturer as determined under subsection (d).

"(4) Any rule prescribed by the Secretary under this subsection may provide for separate standards for different classes of light trucks (as determined by the Secretary).".

SEC. 11005. EXEMPTIONS FOR MANUFACTURERS OF LIMITED NUMBERS OF PASSENGER AUTOMOBILES.

Section 502(c)(1) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(c)(1)) is amended by inserting "for any model year prior to model year 1996" immediately before the period at the end of the first sentence.

SEC. 11006. CALCULATION OF AVERAGE FUEL ECONOMY STANDARDS FOR INDIVIDUAL MANUFACTURERS.

Section 502 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002) is amended further by striking subsection (d) and inserting the following:

"(d)(1) The Secretary shall determine the maximum feasible average fuel economy achievable for passenger automobiles, light trucks, or class of light trucks manufactured by any manufacturer (i) during model year 1996 through 2001 and (ii) during model year 2002 and thereafter by—

"(A) determining, in accordance with subsection (e)(2), the maximum feasible average fuel economy (in miles per gallon) of all automobiles of such vehicle class manufactured by all manufacturers during such period;

"(B) calculating the percentage increase in the average fuel economy of all automobiles of such vehicle class that the maximum feasible average fuel economy determined in paragraph (1) represents compared to the average fuel economy of all automobiles of such vehicle class manufactured in model year 1990 as determined in accordance with section 503; and

"(C) increasing the average fuel economy of automobiles of such vehicle class manufactured by such manufacturer in model year 1990 by the percentage increase calculated in accordance with paragraph (2).

"(2) The Secretary may apply different percentage increases to different vehicle classes, but shall apply the same percentage increase calculated under paragraph (1)(B) to all manufacturers of automobiles of such vehicle class.".

SEC. 11007. DETERMINATION OF MAXIMUM FEASIBLE AVERAGE FUEL ECONOMY.

Section 502 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002) is amended further by striking subsection (e) and inserting the following:

"(e)(1) For purposes of subsections (a)(1), (b)(1), and (c), in determining maximum feasible average fuel economy, the Secretary shall consider—

"(A) technological feasibility;

"(B) economic practicability;

"(C) the effect of other Federal motor vehicle standards on fuel economy; and

"(D) the need of the Nation to conserve energy.

"(2) For purposes of subsections (a)(2) and (3), (b)(2) and (3), and (d), in determining the maximum feasible average fuel economy of all passenger automobiles, light trucks, or a class of light trucks, as the case may be, manufactured by all manufacturers during (i) model years 1996 through 2001 or (ii) model year 2002 and thereafter, the Secretary shall assume that, taken as a whole, the population of automobiles of such vehicle class manufactured by all manufacturers during such model year—

"(A) uses all fuel-saving technologies and designs that are capable of being commercialized by the appropriate period, considering—

"(i) the time at which improved or new technologies and designs could be introduced and the rates at which they might penetrate the market under existing industrial capabilities; and

"(ii) any technical, financial, regulatory, organizational, and marketing limitations to deploying improved or new technologies by such period;

"(B)(i) with respect to passenger automobiles, attains the same performance level (measured by the product of torque and axle ratio divided by curb weight) as passenger automobiles manufactured in model year 1990, taken as a whole; and

"(ii) with respect to light trucks or class thereof, attains performance levels and utility comparable to such class manufactured in model year 1990;

"(C) reflects the same size mix and interior volume as automobiles of such model type manufactured in model year 1990, taken as a whole;

"(D) meets all applicable emission standards; and

"(E) meets all applicable automobile safety standards.".

SEC. 11008. AMENDMENT OF STANDARDS.

Section 502(f) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(f)) is amended—

(1) by striking "subsection (a)(3)" and inserting "subsection (a)(2)" each place it appears; and

(2) by striking "if required by paragraph (4) of subsection (a)," in paragraph (2)(B).

SEC. 11009. PROCEEDINGS.

Section 502(h) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(h)) is amended by striking "Proceedings under subsection (a)(4) or (d)" and inserting

"Any proceeding to promulgate or amend a rule under this section".

SEC. 11010. CREDIT TRADING.

(a) Carrying Forward Credits.—Section 502(l)(1)(B)(ii) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(l)(1)(B)(ii)) is amended to read as follows:

"(ii) to the extent that such credit is not so taken into account pursuant to clause (i), shall be available to be taken into account with respect to the average fuel economy of that manufacturer—

"(I) for any three consecutive model years immediately following the model year in which such manufacturer exceeds such applicable average fuel economy standard with respect to credits earned for exceeding average fuel economy standards for model years prior to 1996; and

"(II) until used with respect to credits earned for exceeding average fuel economy standards for model years 1996 and thereafter.".

(b)(1) Transferring Credits.—Section 502(l) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(1)) is amended by striking paragraph (3) and inserting the following:

"(3) Credits under this subsection may be transferred among manufacturers and among vehicle classes of a manufacturer in accordance with rules issued by the Secretary under paragraph (4)."; and

(2) redesignating paragraph (4) as paragraph (4)(A) and inserting at the end the following new subparagraph:

"(B) Not later than twenty-four months after the date of enactment of the Motor Vehicle Fuel Efficiency Act of 1991, the Secretary shall issue rules implementing the credit trading system authorized by paragraph (4).".

(c) CONFORMING AMENDMENTS.—Section 502(l) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(l)) is amended further—

(1) by striking "automobiles which are not passenger automobiles" and inserting "light trucks" in paragraph (2); and

(2) by striking "class of automobiles" and inserting "light trucks" in paragraph (2).

SEC. 11011. CALCULATION OF FUEL ECONOMY FOR LIGHT TRUCKS.

Section 503(a)(2) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2003(a)(2)) is amended by adding before the period the following: "that are based upon the method required by this section for calculation of average fuel economy of passenger automobiles".

SEC. 11012. AIRBAG CREDIT FOR SMALL PASSENGER AUTOMOBILES.

(a) AIRBAG CREDIT.—Section 503(a) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2003(a)) is amended—

(1) in paragraph (1) by inserting ", subject to paragraph (4)," immediately before "be calculated"; and

(2) by adding at the end the following new paragraph:

"(4)(A) If a manufacturer manufactures small passenger automobiles which comply with Federal Motor Vehicle Safety Standard Number 208 by means of airbags for the driver seating position only or for both the driver and front seat outboard seating positions, average fuel economy for purposes of section 502(a) and (c) shall be calculated as provided under subsection (a)(1), except that in the calculation of the sum of terms under subsection (a)(1)(B) the term applicable to any model type of small passenger automobile for which there are automobiles so equipped with airbags shall be determined by adding—

"(i) the fraction that is created by dividing the number of small passenger automobiles of such model type that are equipped with airbags for the driver seating position only, by 105 per centum of the fuel economy measured for such model type,

"(ii) the fraction that is created by dividing the number of small passenger automobiles of such model type that are equipped with airbags for both the driver and outboard front seating positions, by 110 per centum of the fuel economy measured for such model type, and

"(iii) the fraction that is created by dividing the number of small passenger automobiles of such model type that are not so equipped, by the fuel economy measured for such model type.

"(B) For purposes of this paragraph, the term 'small passenger automobile' means a passenger automobile (i) with a wheel base of less than one hundred inches, or with a curb weight of two thousand seven hundred and fifty pounds or less, and (ii) whose measured fuel economy is at least thirty-five miles per gallon.".

(b) CONFORMING AMENDMENT.—Section 502(e) of the Motor Vehicle Information and Costs Savings Act (15 U.S.C. 2002(e)) as amended by section 11007 of this Act is amended further by adding at the end the following new paragraph:

"(3) In determining maximum feasible average fuel economy, the Secretary shall not consider the alternative calculation for airbag-equipped passenger automobiles under section 503(a)(4).".

SEC. 11013. EXPLANATORY BOOKLET DISTRIBUTED BY SECRETARY OF ENERGY.

(a) MINIMUM NUMBER OF COPIES DISTRIBUTED.—Paragraph (1) of section 506(b) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2006(b)) is amended by adding at the end the following new sentence: "During the twelve-month period beginning on the first day of the first month after the date of enactment of the Motor Vehicle Fuel Efficiency Act of 1991, the Secretary of Energy shall distribute no less than one hundred booklets each year to each dealer and shall distribute as many in addition to one hundred booklets as are reasonably requested by dealers from time to time.".

(b) TECHNICAL AMENDMENTS.—(1) Section 506(b)(1) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2006(b)(1)) is amended further by striking "Administrator of the Federal Energy Administration" and inserting "Secretary of Energy".

(2) Section 506(e) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2006(e)) is amended by striking "Federal Energy Administrator" and inserting "Secretary of Energy".

SEC. 11014. EXCESSIVE FUEL CONSUMPTION FEE.

The Motor Vehicle Information and Cost Savings Act is amended by striking section 507 (15 U.S.C. 2007) and inserting the following:

"EXCESSIVE FUEL CONSUMPTION FEE

"SEC. 507. (a) If the average fuel economy calculations reported by the EPA Administrator to the Secretary under section 503(d) indicate that the average fuel economy of any manufacturer does not meet the applicable average fuel economy standards established under section 502(a), (b), or (c), the Secretary shall assess the manufacturer an excessive fuel consumption fee in an amount determined under section 508.

"(b) The amount of the fee shall be assessed by the Secretary by written notice.

"(c)(1) Not later than 30 days after a determination by the Secretary under subsection (a) that a manufacturer has failed to meet any applicable average fuel economy standard under section 502, such manufacturer may apply to the Federal Trade Commission for a certification under this subsection. If the manufacturer shows and the Federal Trade Commission determines that reduction of the fee which the Secretary shall otherwise assess is necessary to prevent a substantial lessening of competition in that segment of the automobile industry subject to the standard with respect to which such fee is assessed, the Commission shall so certify. The certification shall specify the maximum amount that such fee may be reduced. To the maximum extent practicable, the Commission shall render a decision with respect to an application under this subsection not later than ninety days after the application is filed with the Commission. A proceeding under this subsection shall not have the effect of delaying the manufacturer's liability under this section for a fee for more than ninety days after such application is filed, but any payment made before a decision of the Commission under this subsection becomes final shall be paid to the court in which the fee is collected, and shall (except as otherwise provided in paragraph (2)) be held by such court, until 90 days after such decision becomes final (at which time it shall be paid into the general fund of the Treasury).

"(2) Whenever a fee has been assessed and collected from a manufacturer under this section, and is being held by a court in accordance with paragraph (1), and the Secretary subsequently determines to reduce such fee pursuant to section 508(c), the Secretary shall direct the court to remit the appropriate amount of the fee to such manufacturer.

"(d) Any manufacturer assessed a fee under this section may obtain review of a determination (i) of the Secretary to assess such fee or (ii) of the Federal Trade Commission under subsection (c) in the United States Court of Appeals for the District of Columbia Circuit, or for any circuit wherein the manufacturer resides or has his principal place of business.

Such review may be obtained by filing a notice of appeal in such court within 30 days after the date of such determination, and by simultaneously sending a copy of such notice by certified mail to the Secretary or the Federal Trade Commission, as the case may be. The Secretary or the Commission, as the case may be, shall promptly file in such court a certified copy of the record upon which such determination was made. Any such determination shall be reviewed in accordance with chapter 7 of title 5, United States Code.

"(2) If any manufacturer fails to pay a fee after it has become a final and unappealable order, or after the appropriate court of appeals has entered final judgment in favor of the Secretary, the Attorney General shall recover the amount for which the manufacturer is liable in any appropriate district court of the United States. In such action, the validity and appropriateness of the final order assessing the fee shall not be subject to review.

"(e) A claim of the United States for a fee assessed against a manufacturer under this section shall, in the case of the bankruptcy or insolvency of such manufacturer, be subordinate to any claim of a creditor of such manufacturer which arises from an extension of credit before the date on which the judgment in any collection action under this section becomes final (without regard to subsection (d)).".

SEC. 11015. AMOUNT OF THE EXCESSIVE FUEL CONSUMPTION FEE.

Subsections (a), (b), (c), and (d) of section 508 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2008(a)–(d)) are amended to read:

"AMOUNT OF THE EXCESSIVE FUEL CONSUMPTION FEE

"SEC. 508. (a)(1) The Secretary shall determine the amount of the excessive fuel consumption fee to be assessed under section 507 with respect to passenger automobiles manufactured in any model year by multiplying the base fee provided in subsection (b) by (i) the number of tenths of a mile per gallon by which the average fuel economy of the passenger automobiles manufactured by such manufacturer during such model year is exceeded by the applicable average fuel economy standard established under section 502 (a) or (c), multiplied by the number of passenger automobiles manufactured by such manufacturer during such model year, reduced (at the election of the manufacturer) by (ii) credits available under section 502(l) for such model year.

"(2) The Secretary shall determine the amount of the excessive fuel consumption fee to be assessed under section 507 with respect to light trucks manufactured in any model year by multiplying the base fee provided in subsection (b) by (i) the number of tenths of a mile per gallon by which the applicable average fuel economy standard exceeds the average fuel economy of the light trucks manufactured by such manufacturer during such model year, multiplied by the number of light trucks to which such standard applies manufactured by such manufacturer during such model year, reduced (at the election of the manufacturer) by (ii) credits available under section 502(l) for such model year.

"(b) For purposes of calculating the amount of any civil penalty under this section, the amount of the base fee shall be—

"For model years:

"Prior to 1993	$5.00
"1993	$10.00
"1996	$20.00
"1997 and thereafter	The amount of the fee applicable in the prior model year as adjusted in accordance with the annual implicit price deflator for the gross national product during such model year.

"(c) The Secretary shall have the discretion to reduce the amount of the fee calculated under this section only to the extent—

"(1) necessary to prevent the insolvency or bankruptcy of the manufacturer,

"(2) such manufacturer shows that its failure to meet the standards of section 502 resulted from an act of God, a strike, or a fire, or

"(3) the Federal Trade Commission has certified that reduction of such fee is necessary to prevent a substantial lessening of competition, as determined under section 507(c).

"(d)(1)(A) The Secretary shall, by rule in accordance with the provisions of this subsection and subsection (e), substitute a higher amount for the amount of the base fee which would be used to calculate the fee under subsection (a) in the absence of such rule, if the Secretary finds that—

"(i) the additional amount of the fee which may be imposed under such rule will result in, or substantially further, substantial energy conservation for automobiles in future model years for which such higher fee may be imposed; and

"(ii) subject to subparagraph (B), such additional amount of fee will not result in substantial deleterious impacts on the economy of the United States or any State or region of any State.

"(B) Any findings under subparagraph (A)(ii) may be made only if the Secretary finds that it is likely that—

"(i) such additional amount of fee will not cause a significant increase in unemployment in any State or region thereof;

"(ii) such additional amount will not adversely affect competition; and

"(iii) such additional amount will not cause a significant increase in automobile imports.

"(2) Any rule under paragraph (1) may not provide that the amount per tenth of a mile per gallon used to calculate the fee under subsection (a) be less than the base fee or more than twice the base fee provided by subsection (b).".

SEC. 11016. ESTABLISHMENT OF THE EXCESSIVE FUEL CONSUMPTION FUND.

Section 508 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2008) is amended further by adding at the end the following new subsection:

"(f)(1) There is hereby established in the Treasury of the United States a separate fund, to be known as the Excessive Fuel Consumption Fund. The Fund shall consist of all fees collected by the Secretary under this section.

"(2) Subject to appropriation, the Secretary of Energy may make expenditures from the Fund for purposes of—

"(A) providing financial assistance to the States in accordance with section 514; and

"(B) funding other energy conservation programs, to the extent that the amount available in the Fund exceeds the amount needed under subparagraph (A).

"(3) The Secretary of the Treasury shall hold the Fund and, after consulting with the Secretary of Transportation and the Secretary of Energy, shall report annually to the Congress on the financial condition and operations of the Fund during the preceding fiscal year. The budget of the Fund shall be included in the Budget of the United States Government.".

SEC. 11017. SCRAPPAGE OF OLDER VEHICLES.

The Motor Vehicle Information and Cost Savings Act is amended further by adding at the end thereof the following new section:

"SCRAPPAGE OF OLDER VEHICLES

"SEC. 514. (a) The Secretary of Energy shall provide financial assistance to State programs encouraging the voluntary removal from use and the marketplace pre-1980 model year automobiles.

"(b)(1) Within one hundred and eighty days after the enactment of the Motor Vehicle Fuel Efficiency Act of 1991, the Secretary of Energy, after consulting with the EPA Administrator, shall adopt rules necessary to review and approve State programs that qualify for financial assistance under subsection (a).

"(2) Any rules adopted by the Secretary of Energy under paragraph (1) shall require that to qualify for federal assistance under subsection (a) at least 50 per centum of the cost of the program be paid for from State or private funds.

"(c) The Secretary of Energy is authorized, subject to appropriation, to make expenditures from the Excessive Fuel Consumption Fund for purposes of this section.".

SEC. 11018. TECHNICAL AND CONFORMING AMENDMENTS.

(a) DESIGNATION OF THE EPA ADMINISTRATOR.—Section 502 (g)(1) of the Motor Vehicle Information and Cost

Savings Act (15 U.S.C. 2002(g)(1) is amended by striking "Environmental Protection Agency" and inserting "EPA".

(b) ELIMINATION OF THE SECRETARY'S ADJUSTMENT AUTHORITY.—Section 502(l)(1)(B) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2002(l)(1)(B)) is amended by striking "any adjustment under subsection (d) of this section".

(c) DESIGNATION OF THE ENERGY AND COMMERCE COMMITTEE.—Section 503(b)(3)(D)(ii)(II) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2003(b)(3)(D)(ii)(II)) is amended by striking "Interstate and Foreign Commerce" and inserting "Energy and Commerce".

(d) LEGISLATIVE VETO.—Section 504(a) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2004(a)) is amended by striking "(or in the case of an amendment submitted to each House of the Congress under section 502(a)(4), at any time prior to sixty days after the expiration of the sixty-day period specified in section 502(a)(5))".

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STATEMENT OF JERRY RALPH CURRY, ADMINISTRATOR, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION, ACCOMPANIED BY JOSEPH CANNY, DEPUTY ASSISTANT SECRETARY FOR POLICY

Mr. Curry. Thank you, Mr. Chairman. But as a retired military officer, I would just like to say how pleased I am with the results in the Persian Gulf and how magnificently well our forces have performed over there and how pleased we all are to see this move toward a very hasty conclusion with a minimum loss of life.

The Chairman. We all take joy in that. It is a great day for America.

Mr. Curry. Yes, sir.

The Chairman. By the way, I forgot to mention that you are accompanied by Mr. Joseph Canny, who is Deputy Assistant Secretary for Policy. Mr. Canny, I did not mean to overlook you.

Please proceed.

Mr. Curry. Mr. Chairman, I have submitted for the record my statement and I am just going to summarize it, rather than give you all of it.

Let me begin by stressing two key concepts that you cited when you introduced your bill. You cited process and balance. You characterized the bill, particularly its fuel economy provisions, as the start of a process, rather than a finished product, and stated that the bill seeks a balanced approach to energy security.

Certainly, the administration agrees with that. Without balance, any public policy is headed for rough waters, and that is why in the administration's development of the national transportation policy and the National Energy Strategy balance was a constant consideration for us.

As the Federal agency whose first priority is motor vehicle safety, NHTSA has repeatedly stressed saving lives in striking the balance on fuel economy. My statement offers a brief overview of NHTSA's safety concerns and the status of our efforts to gather information that might be of assistance to your committee in its deliberations.

We have testified before other committees of the Congress that the gains from measures we have taken in recent years to increase the safety of passenger car occupants and other actions now in process to improve the safety of occupants in other light-duty vehicles, that that safety would be compromised or even lost if new legislation should necessitate a significant reduction in the average size and weight of the light-duty vehicle fleet. Yours does not seem to do that.

We are very concerned about these reductions because studies that have been completed indicate that occupants of smaller, lighter cars are more likely to suffer serious or fatal injury than occupants of larger, heavier cars. These studies, which have been peer reviewed, indicate that over 1,300 fatalities and 6,300 serious injuries occur annually as the result of the downsizing of the passenger car fleet that occurred in the 1970's and early 1980's.

A number of highway safety measures have been implemented in the past decade and overall highway safety has steadily improved. We could have done better without downsizing. My organization remains very concerned about the safety implications of these studies.

An analysis of multi-vehicle crashes is being completed now. It will be available this spring and we will provide your committee with these additional results as they become available.

Given last year's heated debates on CAFE, we believe it is essential for a new fuel economy analysis to be done by an organization with an unquestioned reputation for competence, objectivity, and impartiality. And in saying this, we certainly do not detract from the excellent work of Mr. Duleep.

Accordingly, we have contracted for a study by the National Academy of Sciences, which I believe will testify today, to ascertain the prospects for improving the fuel economy of new vehicles in the next decade while still satisfying environmental and safety requirements. This study will also analyze the environmental and safety implications of possible changes in fuel economy standards.

We expect the NAS study to cover all pertinent information currently available on the subject, including the results of small car safety analyses. The principal shortcoming of the CAFE program in the past is that it affects only the supply side of the automobile industry. It encourages the manufacturers to produce fuel efficient vehicles. It does little to persuade the public to buy these vehicles.

Through the National Energy Strategy process, the Department of Transportation worked with the Department of Energy to examine the CAFE program and some possible alternatives. Some of the alternatives noted in the National Energy Strategy report include providing credit trading and averaging among manufacturers, eliminating distinctions between imported and domestic vehicles, revising noncompliance penalties, and basing standards on vehicle size. The exploration of these issues within the administration has been intense and is continuing.

The National Energy Strategy report contains two recommendations on collateral issues that coincide with provisions of S. 341: a recommendation to encourage the use of alternative fuels by lifting the 1.2 miles per gallon cap on Corporate Average Fuel Economy credits for dual energy vehicles; and a recommendation for measures to promote the scrappage of older, less efficient vehicles.

This is sort of a quick summary, sir, of my remarks for the record. With that, I will stop and take your questions as you see fit.

[The prepared statement of Mr. Curry follows:]

PREPARED STATEMENT OF JERRY RALPH CURRY, ADMINISTRATOR, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

Mr. Chairman and Members of the Committee, I am pleased to appear before you today to discuss the subject of motor vehicle fuel economy.

Let me begin by stressing two key concepts that you cited when you introduced your bill: process and balance. You characterized the bill, and particularly its fuel economy provisions, as the start of a process rather than as a finished product, and stated that the bill seeks a balanced approach to energy security. We would agree that, without balance, any public policy is heading for rough waters. That is why in the Administrations development of the National Transportation Policy and the National Energy Strategy, balance was a constant consideration.

As the Federal agency whose first priority is motor vehicle safety, NHTSA has repeatedly stressed saving lives in striking the balance on fuel economy policy. My statement offers a brief overview of NHTSA's safety concerns and the status of our efforts to gather information that might be of assistance to your Committee.

We have testified before other committees of Congress that the gains from measures we have taken in recent years to increase the safety of passenger car occupants, and other actions now in process to improve the safety of occupants in other light duty vehicles, would be compromised, or even lost, if new legislation should necessitate a significant reduction in the average size and weight of the light duty vehicle fleet. We are very concerned about these reductions because the studies we have completed thus far—involving only single-vehicle crashes—indicate that occupants of smaller, lighter cars are more likely to suffer serious or fatal injury than occupants of larger, heavier cars. These studies, which have been peer reviewed, indicate over 1300 fatalities and 6300 serious injuries occur annually as a result of the downsizing of the passenger car fleet which occurred in the 1970s and early 1980's. I want to emphasize that a number of highway safety measures have been implemented in the past decade and that overall highway safety has steadily improved. We could have done even better without downsizing and there is no assurance that future safety measures can overcome the effects of a significant future downsizing. We remain very concerned about the safety implications of these studies. An analysis of multi-vehicle crashes will be completed this spring. We will provide your committee with these additional results.

While reviewing the relationship of vehicle size and weight to safety, we have been separately examining the means available to the manufacturers to increase fuel economy in the next decade. Given last year's heated debates on this subject, we believe it is essential for a fuel economy analysis to be done by an organization with an unquestioned reputation for competence, objectivity, and impartiality. Furthermore, the significant new emission and warranty requirements placed on motor vehicle manufacturers by the Clean Air Act Amendments and the requirements of recently issued or proposed safety rules must be assessed for their effect on the industry's ability to further improve fuel economy.

Accordingly, we have contracted for a study by the National Academy of Sciences to ascertain the prospects for improving the fuel economy of new vehicles in the next decade while still satisfying environmental and safety requirements. This study will also analyze the safety implications of possible changes in fuel economy standards. We expect the NAS study to cover all pertinent information currently available on the subject, including the results of our analyses of small car safety.

The first phase of the study will examine technologies to improve fuel economy and will identify barriers, such as the financial condition of the auto industry, that constrain the rate at which such technologies can be introduced. We want to be fully informed about the potential effects of higher fuel economy requirements on the domestic automobile industry, which is currently facing serious economic difficulties, intense international competition, and severe employment impacts. We have requested that this phase be completed by June 30 of this year. A second phase of the study, to be completed by March 31, 1992, will analyze alternative measures to overcome any barriers identified in the first phase and address many other considerations.

Any public policy goal to achieve greater fuel efficiency must avoid causing excessive harm to the manufacturers or to the car-buying public. We expect the NAS study to assess the range of options available for fuel economy improvements. What is needed is a plan for automotive fuel economy that will promote the widest use of the available options by means that make sense from the standpoint of economic efficiency, energy, the health of the automobile industry, the environment, and safety.

In the debate over energy conservation, much attention has been focussed, quite correctly, on the oil we use for transportation in this country. (Of the 17 million barrels of oil that we use every day, about 11 million are used in the transportation sector.) Unfortunately, too much of the debate has focussed on the CAFE program when there are other, more efficient ways to reduce U.S. oil demand. In the NES, the Administration has proposed an alternative fuels package that is projected to displace 1 million barrels per day of oil by the year 2000. This is more than double the oil savings that would be achieved by even the most aggressive CAFE programs that have been proposed.

The principal shortcoming of the CAFE program has always been that it affects only the supply side of the automobile industry. It can encourage the manufacturers to produce fuel-efficient vehicles, but it does nothing to persuade the public to buy the right types and mix of vehicles to enable the manufacturers to meet a specific CAFE standard. A brief history illustrates this point: In the early stages of the fuel economy program, the manufacturers strongly opposed the establishment of the interim standards for model years 1981-1984, on the grounds that the schedule required too large an increase in the early years. Abruptly, with the Iranian revolution of 1979 and the consequent oil price shock, consumers demanded higher fuel economy and the manufacturers had no problems meeting the "front loaded" schedule. There was even talk that a 30 mpg new car fuel economy level might be achievable by 1985. But before that year, falling oil prices shifted consumer demand away from fuel-efficient vehicles and the manufacturers once again faced difficulty in meeting the 27.5 mpg standard legislated for model year 1985. The technology and production capacity were there, but not the demand.

Through the national energy strategy, the Department of Transportation has been working with the Department of Energy to examine the CAFE program and possible alternatives to CAFE. Some of the alternatives noted in the national energy strategy report include: providing credit trading and averaging among manufacturers, eliminating distinctions between imported and domestic vehicles, revising noncompliance penalties, and basing standards on vehicle size. The exploration of these issues within the Administration has been intense and is continuing.

In all of these efforts, our goal has been to examine fuel economy improvements in a larger context, to balance the gains from each potential improvement against its possible drawbacks. We plan to complete our analyses this summer, and we hope that the committee's schedule on S. 341 will allow time for their consideration.

In closing I want to return to the concept that I mentioned at the beginning of my remarks: this is a process. Hopefully it will be directed toward measures that do not distort the normal signals of the marketplace or compromise the safety of motor vehicles. Consumers should continue to be able to purchase vehicles of a size and performance that meet their needs. They will seek that goal regardless of our efforts, and we must recognize that fact.

Mr. Chairman, I want to add a final word about the National Energy Strategy and NHTSA's role in it. We have participated in the fuel economy task force of the NES from the beginning. The decision to undertake the National Academy of Sciences study, and to defer any recommendations on CAFE until after that study is completed, arose from data needs disclosed during the task force's deliberations. We think there should be a hard look at the potential for new car fuel efficiency, and we fully endorse the statement in the NES report that "there is no need to move precipitously on fuel efficiency policies that are not reasonably expected to impact new vehicle production before 1995."

The NES report does contain two recommendations on collateral issues that coincide with provisions in S. 341: a recommendation to encourage the use of alternative fuels by lifting the 1.2 mpg cap on corporate average fuel economy credits for dual-energy vehicles, and a recommendation for measures to promote the scrappage of older, less-efficient vehicles. The National Energy Strategy Act contains an amendment to lift the 1.2 mpg cap. We believe it would be prudent to await the conclusion of the NAS study before offering further recommendations on fuel economy.

Mr. Chairman, this concludes my remarks. I will be glad to answer any questions you may have.

The CHAIRMAN. Thank you very much, Mr. Curry.

Mr. Plotkin.

Senator BINGAMAN. We will have questions after we finish our panel members.

STATEMENT OF STEVEN E. PLOTKIN, SENIOR ASSOCIATE, OFFICE OF TECHNOLOGY ASSESSMENT, ACCOMPANIED BY K.G. DULEEP, DIRECTOR OF ENGINEERING, ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

Mr. PLOTKIN. Mr. Chairman and members of the committee:

Thank you for the opportunity to discuss with you OTA's work on automotive fuel economy as it relates to title XI of S. 341, the National Energy Security Act.

I am accompanied today by Mr. K.G. Duleep, who is Director of Engineering for Energy and Environmental Analysis, Inc. Mr. Duleep has been assisting OTA in our ongoing fuel economy work.

I would like to submit my written testimony for the record and briefly summarize it here. Mr. Duleep and I will then be happy to respond to your questions, and I believe Mr. Duleep also has a short statement.

S. 341 defines a mechanism for establishing a fuel economy target for the fleet, a maximum feasible average fuel economy or MFAFE, which in turn will be used to define required percentage increases in Corporate Average Fuel Economies for various vehicle classes. S. 341 defines a number of specific conditions for calculating the fuel economy target, including a baseline model year and requirements for fleet size distribution and average performance that will serve as baseline assumptions.

But it still leaves considerable room for judgment by the standard-setters. For example, S. 341 demands consideration of, but does not define, such terms as "economic practicability," "financial and marketing limitations," and so forth.

If new fuel economy standards are as tough as many in Congress seem to be advocating, they will certainly require major financial commitments by the industry and they may create some market risks as well. How much new capital expenditure and market risk is practical or limiting surely is a judgment call.

Neither does S. 341 define a specific calculation procedure for determining MFAFE, although it is clear that there are several competing procedures that will yield very different fuel economy results and thus different fuel economy targets, even if the baseline assumptions are identical.

Let me give one clear example of how two analyses may diverge. Two analysts may look at the current fuel economy performance of a particular technology in the fleet. One analyst might interpret the average performance as indicative of what can be expected when additional applications of that technology occur in the future.

The other might consider that further improvements in technology in the process of manufacturers copying from best examples will lead to fleet-wide improvements, with today's best example of technology performance being a better measure of where the average will be in the future, especially when the future is at least 5 years away and in some cases 10 years away.

Further, standard-setters will have to deal with a great deal of uncertainty and thus have to exercise considerable judgment in gauging the likely performance and market success of new technologies not now in the fleet, especially in calculating the standard for 2002.

S. 341 explicitly recognizes the importance of vehicle size and performance in setting future fuel economy standards. It specifies a particular combination of these two parameters as assumptions necessary to defining the fuel economy target. Both size and performance are critical determinants of fuel economy.

In fact, if the American public were willing to put up with smaller, less powerful cars, U.S. fleet fuel economy could be extraordinarily high, easily over 40 miles per gallon, without any new technologies whatsoever. A recent EPA analysis has shown that, had the public been willing to shift its buying preferences only enough to reduce average vehicle weight by just 6 percent, fuel economy in the 1990 vehicle fleet could have gone from 27.8 miles per gallon to 29.6 miles per gallon, a 6.5 percent increase.

We note that if Congress dropped S. 341's demand that standard-setters consider size and performance to be at 1990 levels and instead required standard-setters to use expected 1996 size and performance levels instead, the fuel economy target would probably drop by at least 1 mile per gallon.

That is, if you allow performance and size to continue to increase you are going to pay a price in terms of fuel economy.

S. 341 proposes to apply a uniform percentage increase approach to establishing fuel economy standards. OTA considers this approach to be superior to the current system, which applies the same standard to all auto makers regardless of the makeup of their fleets. However, we believe that this approach has important problems that Congress should understand.

First, our analysis shows that the various auto makers do not have the same potential for improvement. Some have less room for improvement because they installed advanced fuel economy technologies earlier than others and thus used up some of their technological head room.

OTA's and EEA's studies of the 1988 fleet show that the Japanese auto makers have fuel economies that are higher than can be explained by the small size of their cars alone and that, consequently, they have considerably less potential for improvement in 2002 than do the domestic manufacturers. In other words, the approach established by S. 341 will tend to hurt the Japanese manufacturers precisely because they tended to install fuel-saving technology earlier than their U.S. counterparts.

A second problem is that the uniform percentage increase approach will cause severe problems if there are major shifts in the market that cause established companies to lose market share in the subcompact size class. For example, if Korean auto makers were to rebound and succeed in dominating the subcompact part of the market, both the U.S. and the Japanese auto makers would see their Corporate Average Fuel Economies drop as sales of their smallest models declined.

These problems would be eliminated by standards based on interior volume or size class, and I would be happy to discuss these with you in the question and answer.

I would like to make one last point. S. 341 spaces its standards 5 years apart to give auto makers maximum flexibility. I think that this is wise, but it leaves open the possibility of the automakers presenting regulators with a fait accompli of noncompliance at the end of the 5-year period.

Congress might consider some sort of interim year requirements, especially for the 1996 to 2002 period, that ask for demonstrations of high fuel economy designs on only one or two models, rather than their whole fleet, to demonstrate progress towards the 2002 standard.

This completes my testimony.

[The prepared statement of Mr. Plotkin follows:]

PREPARED STATEMENT OF STEVEN E. PLOTKIN, SENIOR ASSOCIATE, OFFICE OF TECHNOLOGY ASSESSMENT

Mr. Chairman and Members of the Committee, thank you for the opportunity to discuss with you OTA's work on automotive fuel economy. My comments today are limited to only the issues of uncertainty and fairness relating to Title XI of S. 341, the National Energy Security Act. In order to put the importance of the fuel economy issue to national energy policy into perspective, attached to my testimony is the section from OTA Director Jack Gibbons' testimony on the National Energy Strategy entitled "Automotive Fuel Economy" that is being delivered to the House of Representatives today.

I am accompanied today by Mr. K.G. Duleep, who is Director of Engineering for Energy and Environmental Analysis, Inc. EEA has been assisting OTA in our fuel economy analysis, and Mr. Duleep has been responsible for the scenario analyses of potential fleet fuel economy that OTA will be presenting in its forthcoming report on automotive fuel conservation, and that we will touch upon in this testimony.

ESTABLISH A MAXIMUM FEASIBLE AVERAGE FUEL ECONOMY

S. 341 defines a mechanism for establishing a fuel economy target—the MFAFE, or maximum feasible average fuel economy—for the total U.S. fleet. Many of the questions posed in your invitation to testify concerned the reasonableness of the mechanism and the extent to which the "specifications" in S. 341 were precise enough to allow calculation of MFAFE to be "a fairly mechanical task," that is, one not requiring lots of judgment. Presumably, the more judgment that is required, the greater will be the potential for controversy.

It is not likely that determination of MFAFE will be a "fairly mechanical task;" there are several factors critical to determination of the MFAFE that require considerable judgment. Among the more important judgmental questions remaining are:

1. How will the standard setter interpret 502(e) (1) (B), concerning "economic practicability," and (e) (2) (A) (ii), concerning "any technical, financial, regulatory, organizational, and marketing limitations to deploying improved or new technologies by such period?" The basic nature of fuel economy regulation is that the Federal government is requiring automobile companies to improve fuel economy to a greater extent than the companies would otherwise do from the standpoint of their analysis of market considerations alone. The net result will likely be a new car fleet that is more fuel efficient and some combination of poorer performing, of lower average size and weight, and more or less expensive (less expensive only if advanced technology plays much less of a role in achieving higher fuel economy than does reducing average vehicle size and performance) than it would otherwise be without the regulations. Further, the regulations could tend to accelerate model changeovers if the standards are stringent and the deadlines fairly short . . . which may lead to reduced opportunities for the automakers to recoup earlier capital expenditures. There is a lot of room here for judgment about the degree of economic pressure that is "practical" or "limiting." For example: The domestic manufacturers have accelerated model changeovers in the past in response to both market and public policy pressures; standard setters will have to decide what is reasonable to ask them to do to gain the societal benefits of improved fuel economy. Another example: automakers often are reluctant to redesign a component for better fuel economy if it will change the "feel" of the automobile; standard setters must decide how much is reasonable to require of such redesign.

One method for determining MFAFE that could serve as a model for use in regulation is the fuel economy model developed by Energy and Environmental Analysis (EEA), Inc. and used extensively in work for the Department of Energy, Office of Technology Assessment, and others. The EEA fuel economy projections require the definition of an explicit economic scenario as an integral part of the methodology. For example, in recent work for DOE and OTA, EEA has assumed that:

Gasoline prices will rise to $1.35/gallon by 2001 in constant 1990 dollars.

Only moderate growth in personal income will occur, with no significant shifts in income distribution.

Further, the EEA methodology requires that the model user specify the period of time over which fuel savings should be counted as "benefits" in a cost/benefit calculation, and the discount rate to be used. The model can also compute a "maximum technology" case which is not cost-effective for the consumer but may be attractive to policymakers who are concerned that the price of gasoline does not reflect its true costs to society.

The key point here is that different economic assumptions will cause the model to yield different results, and different model users might disagree strongly over which set of assumptions defined the boundaries of "economic practicality" or "financial and marketing limitations."

2. Whose technical analysis will the standard setter use? As the Committee is well aware, there are severe disagreements among the various analysts and interest groups as to the actual technological potential to improve automobile fuel economy. At the Committee's request, OTA has been examining the various estimates, and we expect to report in full within about 2 months. We note, however, that two of the prominent analyses—those of Chrysler (announced at last week's Senate Commerce Committee hearings) and EEA—while basically in agreement about fuel economy prospects in 1995/1996, differ sharply about prospects for 2001. Unless a consensus is achieved about this issue, standard setters will have to choose a preferred method for projecting fuel economy under different regulatory scenarios.

3. What will "average fuel economy performance" be? Various examples of any individual fuel economy technology in today's automobile fleet (for example, 4-valve-per-cylinder engines, roller cam followers) will have different fuel economy impacts depending not only on the nature of the automobiles on which they are installed but also on the design of each example and the extent to which it is well integrated into the vehicular system in which it resides. Especially for those technologies that have not been in the fleet very long, there is likely to be significant room for improvement in their average fuel economy performance. There is an ongoing argument about whether it is reasonable to expect future average levels of technology performance to equal the best examples present today, or whether today's average performance is a good approximation for the level of performance 5 or more years in the future. A standard setter who is a technological optimist regarding the resolution to this argument would select a considerably higher standard than would a pessimistic standard setter.

4. How will uncertainties in the eventual commercialization potential and performance of new technologies be taken into account? Automakers virtually never introduce a new technology into all their model lines simultaneously because they know there is always a danger of unforeseen performance or reliability problems and/or market acceptance problems. Standard setters focusing on the year 2001 standard—when some new technologies may be entering the marketplace—must use considerable judgment to take these uncertainties into account before the initial testing period has occurred.

IMPORTANCE OF SIZE MIX AND PERFORMANCE CHARACTERISTICS IN DETERMINING FLEET FUEL ECONOMY

S. 341 explicitly recognizes the importance of both fleet size mix and performance levels by specifying a particular combination of the two as assumptions necessary to properly defining a feasible fleet fuel economy level. S. 341 requires that fleet fuel economy standards be calculated assuming that the fleet attains 1990 performance levels (as measured by the product of torque and axle ratio divided by curb weight) size mix, and interior volume. The level of fleet fuel economy that could be achieved would change significantly if these assumptions were changed. For example, EPA recently examined the effects on fleet fuel economy of changing the fleet's size mix. Had the relative fraction of the 1990 automobile fleet in each weight class shifted so as to reduce average vehicle weight by about 6 percent (and average interior volume by about 4 percent) fuel economy would have increased from 27.8 mpg to 29.6 mpg, or about a 6.5 percent increase. Given market uncertainties, we can only guess how average fleet size and performance might shift between 1990 and 1995, but we would guess that elimination of the requirement that performance and size be held to 1990 values—that is, allowing the fuel economy standard to be calculated based on an assumed continuation of existing trends of increasing performance and size—would reduce the estimated fuel economy standard by at least 1 mpg.

TRANSLATING MFAFE INTO MANUFACTURER-SPECIFIC STANDARDS

OTA has testified previously on the efficacy of the "uniform percentage increase" method of assigning fuel economy targets to individual automakers. In general, we believe that this method is an improvement over the current method of assigning the same target to all automakers regardless of their market orientation. However, it does create some problems.

The baseline for applying the percentage increase is not a uniform playing field. To the extent that particular automakers have used advanced technology on their new cars and thus obtained better fuel economy results than their competitors, they would then be "rewarded" with both more difficult standards to meet and less technological "headroom," that is, unused technological gains, with which to meet the standards. To determine whether or not a technological "imbalance" of this sort exists, OTA has examined the differences in corporate average fuel economy for the major automakers for the 1988 model year. Figure 1 shows how the actual CAFEs (the lighter bars), stack up against the overall fleet average CAFE normalized to account for differences in size mix among the various companies (the darker bars). Were all pairs of bars the same height, differences in size mix would fully explain the actual differences in CAFE among the different automakers, and there would be no technological imbalance. In actuality, the first two Japanese automakers—Toyota and Honda—attained average fuel economies significantly higher than could be explained by the small average size of their vehicles. In fact, of the 16 percent difference between the fuel economies of the domestic manufacturers (average fuel economy: 27.1 mpg) and the Japanese manufacturers (average fuel economy: 31.4 mpg), only about 8 percent was due to the smaller size of the Japanese-made fleet. This implies that there is a potential problem with an imbalance in the baseline fuel economies achieved by different manufacturers, and that the Japanese would be at a disadvantage if a new fuel economy law demanded a uniform percentage increase over a 1988 baseline.

EEA has analyzed separately the fuel economy potential for the domestic fleet and the Japanese-manufactured fleet assuming application of the same technology. They found that the Japanese manufacturers as a whole have less potential to improve in percentage terms than the domestics—consistent with our analysis above. The maximum and cost-effective fuel economy values are lower by 8 percent in 2001 for the Japanese manufacturers relative to the domestics. Of course, there is significant variation in technological "headroom" among the Japanese manufacturers, as there is among the domestics.

Future market changes can cause problems. Because the "uniform percentage increase" method focuses on a particular baseline year (1990 for S. 341), any important changes in the size mix of individual automakers can destroy the underlying logic of this approach. Unfortunately, it is entirely possible that the next 10 years can see large changes to each automaker's size mix. OTA can envisage a scenario where newly emerging industrialized nations such as Thailand and Taiwan supplement Korea and gain market share in the subcompact and minicompact segment of the U.S. market. If this occurred, the changing mix of models would negatively impact the corporate fuel economies of domestic manufacturers as well as Japanese manufacturers even if fleet fuel economy were positively affected. So far, the Korean assault appears to have stumbled, while Taiwan and Thailand may have many years to go to develop a car capable of competing in the U.S. market—but when and if they do, they could greatly complicate the task of the existing automakers in satisfying any new fuel economy standards.

We note that a series of manufacturer-specific standards based on average interior volume, size class, or market class would avoid these problems. We understand, however, that many policymakers dislike this type of standard because they do not provide pressure on the automakers to make and sell small cars, and they do not create a definite fleet fuel economy target, since the fleet target will change if the size mix of the new car fleet changes.

BALANCING TECHNOLOGICAL RISK AND THE NEED FOR CONTINUING PRESSURE TO IMPROVE

S. 341's specification of only two fuel economy standards over 10 model years reflects industry complaints that frequent changes in standards severely limit industry flexibility and are counterproductive. This creates a dilemma, however. If Congress does not specify standards for the interim period between 1996 and 2001, it runs the risk of the manufacturers presenting it with a "fait accompli" of noncompliance in 2001 with little remedy other than massive, and perhaps politically unacceptable, economic penalties. On the other hand, unless the 2001 standard is not technology forcing and thus requires no new technologies for compliance, demanding interim fleetwide fuel economy increases may expose some automakers to large risks associated with moving new technologies widely into their fleets without having the time to test the technologies for a few years in one or two models. A potential solution to this dilemma is to designate interim milestones for the automakers which involve demonstration of a few high-fuel-economy models with requirements for minimum acceptable production runs. In other words, Congress could require the automakers to show that they're testing out new designs and technologies in a real world situation without requiring them to risk their whole fleet before the technologies are thoroughly proven.

Mr. Chairman, this completes OTA's testimony. Mr. Duleep and I will he happy to answer any questions you may have.

[Attachment.]

EXCERPT FROM TESTIMONY OF JOHN H. GIBBONS, "THE CONTEXT FOR U.S. ENERGY POLICY: CURRENT PATHS AND OPPORTUNITIES FOR THE 1990'S," HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, FEBRUARY 28, 1991.

AUTOMOTIVE FUEL ECONOMY

Automobiles and light trucks account for 40 percent of U.S. oil consumption. The efficiency of the new vehicle fleet increased sharply in the 70s with the advent of higher mileage standards and fuel prices. But gains have ceased in the face of government apathy and consumer preference for increased vehicle acceleration, size, and other characteristics that conflict with improved fuel economy.

OTA believes that there is a substantial potential for further fuel economy increases through purely technological means (i.e., without diminishing consumer choice), but the magnitude of this potential within the next decade is not what we would like it to be. We can identify a reasonable set of technology that would allow a new car fleet fuel economy of about 30 mpg by 1995 and 37 mpg by 2001, both values measured according to the EPA test procedure and assuming that the current mix of vehicle size and weight for the U.S. fleet remains constant.[1] Longer term progress, beyond the year 2000, could be much larger if strong continual incentives for fuel economy are brought to bear on the industry. If Congress believes that even larger gains in fuel economy are necessary beyond that which can be achieved with strictly technical fixes, then it could stimulate a basic shift in the size and performance of the fleet either through regulatory or economic means.

Because today's auto purchasers feel free to choose among both the automobile fleet and the fleet of minivans, vans and light trucks in their selections for passenger transportation, Congress will have to exert the same pressure on all these vehicles if its economy goals are to be met, especially since vans and light trucks escape the discipline of the present standards for passenger cars. In OTA's study on Global Oil Change (noted earlier) the options for improving automotive fuel economy included scenarios that permitted altering mix of vehicle size and weight for the U.S. fleet as well as aggressive introduction of technical improvements, including a shift to diesel engines. Under such assumptions, new car fleet efficiencies of 42 mpg by 2000 and 58 mpg by 2010 might be achievable.

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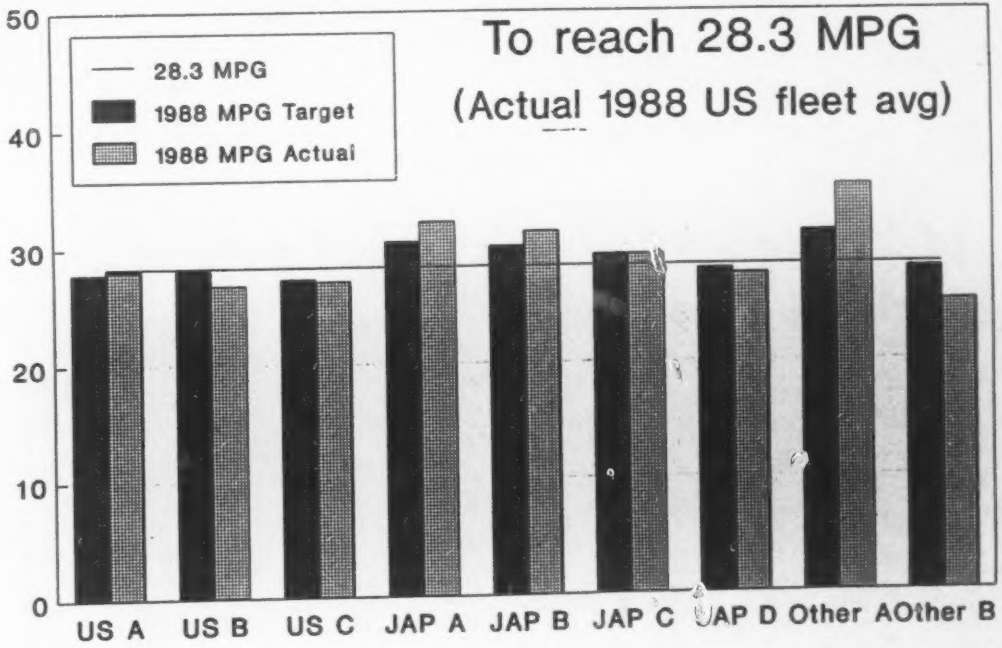
[1] These values assume that each manufacturer is required to meet a company-specific standard that reflects its particular technology capability. By using all technologies identifiable today as likely to be achievable for 2001 model year regardless of cost, and assuming a rollback to 1987 size and performance, we believe the entire U.S. fleet could achieve 39 mpg.

FIGURE 1

Size Class Weighted Fuel Economy Actuals vs Targets, 1988



SOURCE: OFFICE OF TECHNOLOGY ASSESSMENT, BASED ON OAK RIDGE DATA

The CHAIRMAN. Thank you very much, Mr. Plotkin. Mr. Duleep.

STATEMENT OF K.G. DULEEP, DIRECTOR OF ENGINEERING, ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

Mr. DULEEP. Mr. Chairman, thank you for giving me an opportunity to provide testimony to this committee.

One element of the current debate on CAFE standards has focused on the technological potential to improve light-duty vehicle fuel economy. EEA's analysis on technological capability to improve fuel economy to 2001, conducted for the Office of Technology Assessment and since updated for other clients, has received considerable attention in this context.

EEA is in the position of having provided one of the few comprehensive technology analyses which is available publicly. As a result, our work has been used for a variety of purposes and has been criticized or at times misquoted in public. I hope I can set the record straight.

Our work in fuel economy is focused only on technical issues and EEA takes no stand as to whether fuel economy regulations are appropriate or even desirable. As technical consultants, we provide fuel economy estimates based on input assumptions on the macroeconomic conditions, as well as consumer behavior in the future. Assumptions regarding the price of gasoline, personal income, consumer preference for luxury options, specify the size, the luxury level, and the horsepower of future cars.

The assumptions regarding broad market trends and consumer behavior are specified by our clients for our work and can certainly be respecified if necessary. At the same time, we stand by the technology analysis, which we believe is defensible.

Most of the controversy has been generated by two aggregate tables that have been pulled from the EEA report to OTA with little understanding of the meanings of the terms employed or the input assumptions. In January of 1990, I explained our technology benefit estimates at a meeting attended by the staff of several Federal agencies and the staff of domestic car manufacturers. It was apparent to all present that some individuals had misinterpreted the tables, especially the technology designations, which were unfortunately not fully explained in the same report.

I believe that my presentation at the meeting made it clear that the EEA analysis did not contain any gross errors that were initially attributed to it and that the results were credible.

Since that time, one auto manufacturer's representatives have met with us to further reconcile their estimates with ours. As a result of this interaction, we have made some adjustments to our estimates.

I emphasize that we now agree on the majority of individual technology benefit estimates with this manufacturer, but we still disagree on a few. Even in some cases where we disagree, we know the reason for the disagreement.

For example, one technology that we estimated a technology benefit for is multi-point fuel injection and we included the effect of deceleration fuel shutoff, whereas some other people's estimates do not since they believe that fuel shutoff leads to poor drivability.

However, some manufacturers already use this technology and we believe that the technology should be considered for implementation by 2001.

In the future, we expect to continue our dialogue with other manufacturers to resolve remaining differences.

Critics other than the auto manufacturers have suggested that the EEA technology list is hypothetical and that the claimed benefits are unattainable or they are too expensive. The list compiled by EEA uses only those technologies that are already in production in at least one model sold in the U.S. today.

In 1988 and 1989 rulemakings on fuel economy, DOT has published similar lists and some of its fuel economy benefit estimates are actually higher than those used by EEA. Published product plans of the domestic manufacturers reveal that every one of the technologies on EEA's list will be in domestic production by 2001.

Claims that some of the technologies are far too expensive to adopt must be viewed in the light of the fact that firm plans actually exist to introduce the technology in the near future.

In developing new regulations or legislation on fuel economy using the OTA projections, many factors other than technology need be considered. As noted, our projections in the OTA report were based on assumptions regarding the size mix, luxury levels, and performance capabilities of future automobiles. It is not clear how manufacturers can ensure that consumers will indeed demand cars with these attributes and this is an issue worthy of examination.

We agree with the manufacturers on other issues raised with respect to proposed CAFE regulations, such as the short lead time available to achieve fuel economy goals, the need to invest heavily in new products during a recession, and the risk inherent in designing high fuel economy products when consumers seem to be demanding increased levels of performance and luxury.

I believe that the uncertainties in technology benefit estimates are not a major issue in comparison with these issues, although some of the rhetoric seems to suggest otherwise.

Thank you for your attention. I will be pleased to answer any questions.

[The prepared statement of Mr. Duleep follows:]

PREPARED STATEMENT OF K.G. DULEEP, DIRECTOR OF ENGINEERING, ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

Thank you for giving me an opportunity to provide testimony to this committee. One element of the current debate on CAFE standards has focused on the technological potential to improve light duty vehicle fuel economy. EEA's analysis on the technological capability to improve fuel economy to 2001 conducted for the Office of Technology Assessment, and since updated for other clients, has received attention in this context. EEA is in the position of having provided one of the few comprehensive technology analyses which is available publicly. As a result, our work has been used for a variety of purposes, and has been criticized or (at times) misquoted in public. I hope I can set the record straight.

Our work on fuel economy has focused only on technical issues and EEA takes no stand as to whether fuel economy regulations are appropriate or even desirable. As technical consultants, we provide fuel economy estimates based on input assumptions on the macroeconomic conditions as well as consumer behavior in the future. Assumptions regarding the price of gasoline, personal income and consumer preference for options specify the size, luxury and horsepower of future cars, while our technology analysis determines the fuel economy of cars with these attributes. The assumptions regarding broad market trends and consumer behavior are specified by our clients for our work, and can certainly be respecified if necessary. At the same time, we stand by the technology analysis which we believe is defensible.

Most of the controversy has been generated by two aggregate tables (for 1995 and 2001) that have been pulled from the EEA report to OTA with little understanding of the meanings of the terms employed or the scenario assumptions. In January of 1990, I explained our technology benefit estimates at a meeting attended by the staff of several Federal Agencies and the staff of domestic car manufacturers. It was apparent to all present that some individuals had misinterpreted the tables, especially the technology designations which were, unfortunately, not explained fully in the same report. I believe my presentation at that meeting made it clear that the EEA analysis did not contain any gross errors that were initially attributed to it, and that the results were credible.

Since that time, one auto-manufacturers' representatives have met with us to further reconcile their estimates with ours. As a result of this interaction, we have made some minor adjustments to our estimates. I emphasize that we now agree on the majority of technology benefit estimates with this manufacturer, but we still disagree on a few estimates. Even in some cases where we disagree, we know the reason for the disagreement. For example, our technology benefit estimate for "multipoint fuel injection" includes the effect of deceleration fuel shutoff, whereas others' estimates do not, since they believe that fuel shutoff causes poor driveability. However, some manufacturers use this technology and we believe that such technology should be considered for implementation by 2001. In the future, we expect to continue our dialogue with other manufacturers to resolve remaining differences.

Critics other than the auto-manufacturers have suggested that the EEA technology list is hypothetical and that the claimed benefits are either unattainable or too expensive. The list compiled by EEA uses only those technologies that are already in production in at least one model (import or domestic) sold in the U.S.A. today. In 1988/89 rulemakings on fuel economy, DOT published similar lists, and some of its fuel economy benefit estimates are actually higher than EEA's. Published product plans of the domestic manufacturers reveal that every one of the technologies on EEA's list will be in domestic production by 2001. Claims that some of these technologies are far too expensive to adopt must be viewed in light of the fact that firm plans exist to actually introduce such technology in the near future.

In developing new regulations or legislation on fuel economy using the OTA projections, many factors other than technology need be considered. As noted, our projections in the OTA report were based on assumptions regarding the size mix, luxury levels and performance capability of future automobiles. It is not clear how manufacturers can ensure that consumers will demand cars with these attributes in the future, and this is an issue worthy of examination. We agree with the manufacturers on other issues raised with respect to proposed CAFE regulations such as the short lead time available to achieve fuel economy goals, the need to invest heavily in new products during a recession, and the risks inherent in designing high fuel economy products when consumers seem to be demanding increased levels of performance and luxury. I believe that the uncertainties in technology benefit estimates are not a major issue in comparison with these issues, although some of the rhetoric suggests otherwise.

Thank you for your attention. I will be pleased to answer any questions that the Committee may have.

The CHAIRMAN. Thank you very much, Mr. Duleep.

Mr. Curry, I believe, I strongly believe, first that the American public wants stronger CAFE standards. Secondly, it is very easy to demonstrate that Congress wants them, certainly the Senate. The Bryan bill got 57 votes in the Senate, and there is some chance that CAFE standards, I believe, would get even more than 60 votes if designed properly.

If we could come up with a proposal that would allow for safety and proper size and performance, would the administration back that?

Mr. CURRY. I have to speak for my agency and say to you that on the surface it seems to make sense to me to do that and to support it. It would depend, though, to me before I could support it on the specifics, but in principle the answer is yes.

Certainly the administration joins you in wanting increased fuel efficiency, fuel economy. We agree totally that the American public wants the same thing. It is the sensible thing to do, the right direction to move, and I believe the automobile manufacturers who will testify today will tell you that they too believe that we should move in the direction of improved fuel economy.

The **Chairman**. Well, I strongly believe the only way we are going to be able to pass comprehensive energy legislation is to have CAFE as part of that. And in view of what you just said, I hope you will help us design sensible CAFE standards. By sensible, I mean that it does not unduly compromise size, performance, safety, or the American automobile industry or the American economy along with it.

I think it is possible to do that and I hope that the new NHTSA study will show us the direction to go in.

Now, Mr. Duleep, in our legislation we make certain assumptions as to size, as to five different criteria: size, performance, technology, emissions, and safety. Now, of those, emissions are set by the Clean Air Act, that is easy. Safety is set by standards which are already in place, so that is easy.

With respect to technology, we often hear that Detroit can do it if you make them do it; if you set a standard, they can produce. And sort of in the back of our minds, or at least in the back of the minds of a lot of people in Congress, there is the thought that they can come up with some magic carburetor or some new valve or whatever that will suddenly produce these great results.

In terms of technology for, let us say, between now and 1996, which is the first measuring point in the Bryan bill, as well as our bill, what can be done in terms of technology by that time?

Mr. **Duleep**. Mr. Chairman, as you know, the car has been around for 100 years, and the technology for internal combustion engines is very mature. All of the gains that will occur are evolutionary improvements, small improvements in lots of little things.

The product plan lead time for the car manufacturers is typically 5 years, perhaps even more now with all the safety and emissions issues. As a result, 1995, 1996 product plans are already in place. Many of the cars are fully designed. The tooling may have been ordered for many of these vehicles.

As a result, there is very little that the manufacturers can do over and above what they have already planned for.

The **Chairman**. So even if something was discovered, some new technological leap, by 1996 it could not be deployed?

Mr. **Duleep**. That is absolutely true, sir. But even if something was discovered now, from a concept stage to bring it out onto the street takes over 10 years. So even 2001, a discovery, that is probably the first date we might see it on one model, not across the fleet.

The **Chairman**. So in effect you are saying that between now and 2001, technology is fairly well known; the exact deployment and utilization may not be known by 2001, but all of the parts and all of the technologies are fairly well known; is that correct?

Mr. **Duleep**. The menu of technologies is certainly well understood, in the sense that we know what is out there and what could possibly be incorporated. As to whether they could do it in ten years, whether consumers would buy it and how much it costs, maybe there are issues connected to those variables.

The **Chairman**. Would I be correct, therefore, in assuming that whatever we order will probably be more a change in size and performance, result in a change in size and performance, rather than be a technology breakthrough?

Mr. **Duleep**. For the short term, for 1996, that is almost certainly true. There is very little additional technology they can bring on, given the fact that the 1992 model year starts in 4 or 5 months and the 1995 or 1996 model year is only, what, 3½ years away now. So that is certainly true for 1995-1996.

For 2001, the manufacturers are more flexible. Indeed, there are lots of things going on that are under development and some of those could be accelerated, that is pulled ahead from perhaps production in 2005 or some such time frame like that, if standards were set.

But certainly for the short term you are completely correct.

The **Chairman**. Well, for 2001 is there anything that we can order done that they would not otherwise do in terms of technology?

Mr. **Duleep**. What you could perhaps order done would be to phase out some of the older technologies much more quickly than they would have otherwise. As you know, manufacturers invest very heavily in a particular technology. The car business is dominated by fixed costs, and a new model is designed and they pay for the initial costs of design, research, development, and tooling over the life of the car.

So they recoup the money that they spent in the 3 years prior to when the car came out in the 8-year time frame when they sell the car. What you are asking them to do is, of course, accelerate that process and bring out new models or phase out some of their older models earlier. So that is a possibility.

Some of the technologies that you could order them to put in may be things that would be expensive or things that they may not do ordinarily,. They may include, for example, greater use of aluminum, use of aluminum for engines. That is one such technology.

Another might be to utilize extensively four-valve engines of smaller displacement, so that you maintain similar levels of performance, not identical, but you accelerate the introduction of these technologies across the fleet, when in many cases they may not have put them in because costwise and from the consumer viewpoint they are marginal or even cost ineffective.

The **Chairman**. Now, Mr. Duleep, I said in introducing you that you had the only computer model that relates criteria to performance. Is that correct?

Mr. **Duleep**. Sir, I am not aware of what is out there. I know that DOT has done a lot of very good work in the eighties.

The **Chairman**. At least you have a computer model and you are used by a lot of——

Mr. **Duleep**. I know the auto manufacturers certainly have much better models than I do, sir. But they are not available publicly.

The **Chairman**. All right. You do consulting work for all sides?

Mr. **Duleep**. Yes, sir.

The **Chairman**. In effect, you do not have a dog in this fight, as we say?

Mr. **Duleep**. I hope not.

The **Chairman**. All right.

Can you tell me whether or not it is—I guess I am asking about the reliability of this kind of computer modeling and the science. I know you have to make a number of assumptions that are on things other than size, performance, technology, safety, and emissions standards.

But can you know fairly well or can it be determined by using computer models what the effect of a mileage standard will be on things like size and performance?

Mr. **Duleep**. I believe, with some potential range for error, that is possible, sir. As you know, people can honestly disagree about some things, and we have seen that. We talked to all the manufacturers and sometimes one manufacturer will tell us that this technology is wonderful, another manufacturer will dump all over it, which is the "not invented here" syndrome. So we have seen that.

So there are genuine disagreements among manufacturers. We try and make a call on what most people say or where the majority opinion goes in terms of future technologies. So there are some possible variations that we see there.

The **Chairman**. Some variations, but by and large it is knowable?

Mr. **Duleep**. It is theoretically knowable, that is correct, sir.

The **Chairman**. And it is sort of a scientific endeavor, rather than just a purely subjective call as to what the results of policy will be, or what the results of criteria will be—what the results of a miles per gallon will be on criteria, size and performance particularly?

Mr. **Duleep**. Even there, there are some subjective issues. For example, many of you may have driven Japanese cars and American cars which may have very similar wide-open throttle performance. But once you get the engines revved up, many of these cars can perform very similarly, but they have different feels.

Those are very subjective and difficult issues to handle as to whether drivers like the way they take off on a highway ramp or off a stop light. These are all issues that people in the auto industry talk about in great detail, and they may seem trivial to you, but they feel that it is important for consumers.

So there are those sort of issues that are difficult to resolve. So there is a subjective component to some of the constant performance issues, if you will.

The **Chairman**. One more question for you, Mr. Duleep. Supporters of the Bryan bill often cite your analysis or studies based on your analysis as a basis for their CAFE targets. Does your analysis support that argument about the Bryan bill? You are familiar?

Mr. **Duleep**. I am familiar with the Bryan bill. One of the things that I mentioned in my statement, you can get lots of answers depending on what you assume is the size and performance mix of cars. And as Mr. Plotkin pointed out, you can set a standard of 60 miles per gallon today and there will be only two cars available, but people can still go out and buy two cars, choose between the Honda and the Geo Metro or something like that.

So anything is possible if you restrict what is available. So from that standpoint, it is very hard to say whether the Bryan bill is possible or impossible, because it may involve product restrictions which allow you to meet it.

The **Chairman**. Now, let me then ask you, Mr. Plotkin, what then in your view would be the result of the Bryan bill? What would be the response of the auto makers? How would they or could they comply with the Bryan bill?

Mr. **Plotkin**. First, I had better be careful in breaking up this answer into what would happen in the short term, the 1996 standards—I believe that is the year of the new Bryan legislation—and the 2001 standards.

They would have a great deal of difficulty meeting the 1996 standard, but I think they would do a few things. First, I think they would clearly rush flex-fuel alternative vehicles into the marketplace. They are pretty close to commercialization now and they can get up to, I believe, 1.2 miles per gallon mileage credit.

The **Chairman**. Flex-fuel, those that are dual-fuel capable.

Mr. **Plotkin**. Dual fuel capable, that is right. So they get 1.2 miles per gallon credit from a maximum number of vehicles produced for that. The differential cost is not so great that they would necessarily have trouble selling them. Probably they could sell them for the same price as a single fuel vehicle.

I think the major thing they would then try to do is they would try to have to sell, A, smaller cars; and B, they would probably have to do things like restrict higher performance engines—a whole number of strategies that basically deal with size and performance, to get their fuel economy as high as possible. I do not think there is much they could do in the new technology area.

For the 2001 standard, they have a lot more options. First of all, in that time period they could probably start to bring dedicated alternative fuel vehicles into the fleet, and they have some real potential for generating mileage credits for them.

The **Chairman**. First of all, for the benefit of everyone, the Bryan bill requires in 1996 a 20 percent improvement.

Mr. **Plotkin**. 20 percent improvement.

The **Chairman**. With a minimum of, what is it, 27.5 miles per gallon; and then a 40 percent improvement by 2001, is it?

Mr. **Plotkin**. I believe so.

The **Chairman**. With a 33 miles per gallon minimum standard. Now, what would, say, Ford Motor Company do with its big Ford or its Mercury or its Lincoln Town Car?

Mr. **Plotkin**. I think they would have trouble selling them and keeping their head above water in terms of meeting that fuel economy standard in the short term. Again, for the longer term they have the possibility—they have a lot more strategies open to them because they have time.

Again, they have the possibility of generating mileage credits. They have the possibility of bringing some new technologies into the market. Now, I believe that under normal conditions these technologies would be brought in very slowly.

For example, if you took something like a two-stroke engine, there are some manufacturers claiming that somewhere around the middle of this decade, 1995, 1996, they are considering introducing this engine. Under normal circumstances, they would probably bring it in on one model and leave it in for a few years, 2 or 3 years, to guarantee that there were no long-term problems that they had not picked up in their test program.

The **Chairman**. Let me ask the question another way. I had the opportunity yesterday to have a long and interesting conversation with Mr. Plotkin and Mr. Duleep, and one thing that occurs to me, we are probably going to have to have more hearings on this subject because it is so complicated and so interesting and so important.

But when I was questioning Mr. Plotkin yesterday about what may be the results of the Bryan bill, he said: Well, you cannot do much on—check me if I am correct—you cannot do much on technology, certainly, in the short term. That is pretty well set. Safety and emissions is set. So in order to comply, Ford would probably have to do away with the big models.

Then, well, the American public wants some big models, so who supplies them? Well, you have got Mercedes over there, who makes only one line and those are big cars and those are 23 miles per gallon now. And all Mercedes would have to do would be to improve from 23 to 27.5 miles per gallon. So one result could be that Mercedes moves in, takes all the big car market.

You still get the same—I mean, if they can reduce the price enough to make it affordable to ordinary Americans.

Senator **Ford**. Well, you can lease them.

[Laughter.]

The **Chairman**. They might go in and take that market away because of what we do, without really improving miles per gallon. Now, explain, if I am inexactly saying it, explain why that is.

Mr. **Plotkin**. I would like to shift this burden to K.G., because he actually brought this up, and I am delighted not to have to explain it.

K.G.

[Laughter.]

Mr. **Duleep**. Sir, without going into specifics, it is quite unlikely that Mercedes might shift its brand image from luxury cars to your more run of the mill $15,000 cars. I doubt if the specific example that you cited could happen.

But I think what you raise in the broader context is this opportunity for gaming the system, because now you have different standards for different manufacturers. There is still no idea what happens if you are a new company; it is 20 percent over what? So maybe all these companies need to do is to reformulate themselves as new corporations and all of a sudden they have a different standard.

So there is all these unresolved issues.

The **Chairman**. The new entrants from, where, Korea and Thailand and others are anxious to get into the car manufacturing business, are they not?

Mr. **Duleep**. Yes, sir. It has become a global market and in the next 10 years we do not know who is going to be coming in or what could happen to the market. But certainly it leaves open a possibility of gaming the system, and it is quite difficult to figure out who might do what because those are corporate strategy issues to which we have no access.

The **Chairman**. I do not want to take too much of this time here, and I apologize to my colleagues. But I did want to bring those things out.

Let me close my first questioning here by just bringing up the subject which I would like to revisit, that is Mr. Plotkin's idea of what he calls "VAFE," which is in effect, instead of a Corporate Average Fuel Economy, it is volume. In any event, what he has in mind is to require an improvement per volume of automobile, which would do away with the gaming of the system.

Would you explain briefly what you mean, because I think we will try to revisit this if we can come up with a formula based on what Mr. Plotkin says that can satisfy some of the criticisms of it, very briefly.

Mr. **Plotkin**. The reason I came up with this—actually, I will not claim credit for this. It has been around for quite a while. The reason I selected this measure to discuss in my earlier testimony was that right now we have a system that says, no matter how large a car you make, you have got to meet exactly the same standards. That means that if you only make small cars CAFE is easy, you do not really have to do anything, whereas if you make only large cars CAFE can be very difficult to meet.

What would be more desirable would be for each manufacturer to be pushed as hard as any other manufacturer. One of the most efficient ways to do that is to say, if a manufacturer makes mostly large cars he has got a slightly more lenient standard, which is keyed to the difficulty of meeting that particular standard with his size mix. If you make only small cars, you are going to have a more stringent standard.

If you are trying to reach a fleet average of, say, 35 miles per gallon, GM might only have to meet 33, Toyota might have to meet 37, depending precisely on whether Toyota stays in the small car market and whether GM stays in the large car market, because that is basically what it is.

If a company were to shift out of its market share and build a lot more subcompacts or a lot more large cars, its standard would change as well. But the idea is you set the standard so that each company faces about the same technical challenge, and that way I think you have got an even playing field.

The **Chairman**. Well, that subject in itself would take a hearing or two, so I will just dangle the question there and turning the questioning over to Mr. Wallop.

STATEMENT OF HON. MALCOLM WALLOP, U.S. SENATOR FROM WYOMING

Senator **Wallop**. Thank you, Mr. Chairman. I would ask for consent then that an opening statement be inserted in the record.

The **Chairman**. Without objection.

[The prepared statement of Senator Wallop follows:]

Prepared Statement of Hon. Malcolm Wallop, U.S. Senator From Wyoming

Mr. Chairman, it is not possible to talk about a comprehensive national energy strategy without also talking about national transportation practices. Our country's economic vitality is dependent on the efficient transportation of people, goods and services. Yet the very dependence of our transportation on oil jeopardizes our national security and, in turn, the economic and social vitality of our Nation.

All Americans have come to expect a high standard of mobility and a diversity of transportation choices which must be maintained if we are to retain our economic vitality. This requirement must guide our choices when formulating a National Energy Strategy.

This is particularly true in the area of personal transportation where our current energy dependence affords us an opportunity to promote competitive, market-oriented transportation choices. Our approach must rely on mechanisms to encourage the adoption of feasible energy efficient technologies. Our approach must not substitute Congressional judgment for that of industry in deciding what technologies are feasible.

Since the mid 1970's mandatory fuel efficiency standards have resulted in significant energy savings. However, the fuel efficiency wars of the late 1970's gave way to the horsepower wars of the 1980's after world oil prices collapsed in real terms to a 34-year low in 1988. Price signals were telling the new-car buyer that fuel was cheap and plentiful and they were acting accordingly, including driving more.

Compounding the efficiency problem, during this period many American consumers made a major shift from cars to light trucks and vans with an average fuel economy of only 20 mpg (24 for imports) compared to 28 mpg for new cars. By 1989, light trucks were fully one-third of automobile sales.

However, prudence dictates that we must get back on the "energy efficiency" road which is best accomplished by cost considerations, rather than by regulation. That is more easily stated than accomplished, and one must be careful about too easy comparisons with Europe and Japan whose smaller, more densely populated regions offer greater practicality for mass transportation rail systems, and whose environmental requirements are less. Our job is to find our own path to efficiency.

We do not appear to have that choice. Therefore, in this area the measure before us contains a provision that is intended to achieve a more equitable approach than current law for the regulation of automobile fuel economy.

In my view, the only meritorious aspect of the CAFE provision in S. 341 is that it is preferable to that taken by Senator Bryan in his proposal. I would much prefer a more market-oriented approach. The objectives of this provisions are several:

> First, the provisions are intended to provide for more flexibility in meeting whatever energy efficiency standards are set;
>
> Second, the standards are based on what is technologically feasible, rather than on some utopian requirement based on dreams of another world or a desire to use regulations, rather than market incentives to force technology innovation; and
>
> Third, the standards are to reflect concern for highway safety.

I fully expect that the provisions of S. 341 will stimulate detailed comments by all interested parties. I invite comment for both improvements and alternatives to these provisions. I am particularly interested in alternatives that would place greater reliance on market incentives.

Ultimately we must devise a cost-effective approach to automobile energy efficiency that does not compromise highway safety or reduce the high standard of mobility which all Americans rely on for the movement of people, goods and services. Thank you Mr. Chairman.

Senator WALLOP. I am very glad for this hearing this morning. It has taken away some of the glibness of CAFE as a sort of badge you can wear on your sleeve and say: I am for CAFE and therefore I am really a modern conservationist, ready for the new energy policy. And that is, as has clearly been pointed out, not so easily applied as the label. The label sticks on anything. There is a question whether anything after that gets to the marketplace, especially American jobs in the process, which I think is an important consideration.

Another consideration, and I want to examine it a little bit, and I think probably you, Mr. Duleep, but Mr. Plotkin, if it is more appropriate for you—I am not exactly sure who should respond, but I think it is Mr. Duleep. And that is, would you agree that analyses of the feasibility of meeting any of the specified automotive fuel economy must of necessity assume the retention of the emissions standards that are contained in the 1990 Clean Air Act Amendments?

Mr. **Plotkin**. Yes.

Senator **Wallop**. You figure we are going to have to?

Mr. **Plotkin**. Absolutely.

Senator **Wallop**. It seems to do otherwise leads to overly optimistic estimates of the potential fuel efficiency gains. What assumption did you make with regards to the requirements in the 1990 Clean Air Act Amendments? If I am not mistaken, the initial analyses were performed prior to the enactment of those amendments, is that correct?

Mr. **Duleep**. Senator, I believe you are correct. The initial analysis, and it stated that explicitly in the report, assumed there would be no change in the standards at all. And we have since updated the analysis and I believe that the newer numbers, which do incorporate these effects, will be reported by Mr. Plotkin in his OTA report.

Senator **Wallop**. But they will be different?

Mr. **Duleep**. They will be different.

Senator **Wallop**. It is reported—maybe this is you, Mr. Plotkin—that electrically heated catalysts will be needed to meet the more stringent HC and CO standards, and if so then the accompanying weight increases, together with other engine modifications, are estimated by some experts to reduce fuel economy by 7 percent.

Would you comment on that?

Mr. **Plotkin**. The only comment I would make to that is, first, that I believe that the electrically heated catalyst might be needed to meet some of the ultra-low California standards. It is not clear that they will be needed to meet, in fact I do not believe they will be needed to meet, the tier one Clean Air Act standards.

As far as the 7 percent figure, all I can say is that there are so many numbers being bandied about all of these issues, until they are on the fleet I think we need to wait and see. 7 percent sounds very high.

Senator **Wallop**. Let me express another concern, limitations on the use of certain engine technologies. For example, the lean burn gasoline technologies which are utilized in Europe by companies such as Toyota are capable of achieving a 10 percent increase in fuel economy over comparable gasoline engine technologies, but I understand that with such technology it is very difficult, if not impossible, to control the nitrogen oxide emissions to the levels required by the tier two emissions of the 1990 amendments.

Would the Clean Air Act preclude use of such promising energy efficiency technology?

Mr. **Plotkin**. The lean burn engine has been around for a long time. It is true that right now you cannot use a reduction catalyst for NO_x with a lean burn engine. But I do know that the auto companies are working on solving that problem, and Toyota has told me that they are making excellent progress.

So that if they succeed—and I think the time frame is middle 1990's again—then they could bring in the lean burn engine and get some of the benefits from it. So the Clean Air Act puts obstacles in the way, it puts technological obstacles in the way of using the lean burn engine, but it is not necessarily so that it absolutely restricts it. You just need further development of catalyst technology.

Senator WALLOP. But as I understand it, in order to comply with the Clean Air Act it is going to take more than having the catalyst technology and the statement of the manufacturer that it meets it. I mean, EPA is not going to allow, and probably is not capable of allowing, these technology advances as they arrive in the middle 1990's, because of testing requirements and other demonstrations.

Mr. PLOTKIN. I am not really sure I can answer that.

Senator WALLOP. Is it not at this moment in time a little unrealistic to base U.S. efficiency standards on the European experience with such technology, where they do not have the environmental requirements?

Mr. PLOTKIN. But sir, we are not. Our analysis examines technology in use in the U.S. fleet, not in the European fleet.

Senator WALLOP. But the comparison is always made that the Europeans, and I think even Mr. Duleep said, one of your testimonies said, that the Japanese automobiles, for example, get far greater mileage per volume than do comparable Americans.

Mr. PLOTKIN. Well, in reality, first, I do not believe that on a model by model basis that the Japanese necessarily get far greater mileage. But the Japanese models that we are talking about are Japanese models sold in the United States and meeting U.S. emissions standards.

All of our analyses focus on technologies that, again, are in place in at least one model in the U.S. fleet. And in fact, the lean burn engine is not on our technology list because it is not sold currently, because of the NO_x problem.

Senator WALLOP. Let me say that one of the objectives of both the administration's strategy, the National Energy Strategy, and S. 341 is to foster the use of alternative fuels, such as natural gas. You mentioned multiple fuel-capable automobiles.

Yet, compressed natural gas burns at extremely high temperatures, which leads again to great difficulty in controlling NO_x emissions.

Does the Clean Air Act constrain the feasibility of using compressed natural gas as an alternative transportation fuel?

Mr. PLOTKIN. I have heard manufacturers of these type vehicles claim that they can meet the standards. So based on that, I would assume that it would not constrain it. But I am not absolutely sure of that.

Senator WALLOP. Well, earlier, Mr. Curry, DOE estimated that a .7 grams per mile NO_x standard could increase oil consumption in 2010 by about 250,000 barrels a day and would restrict or eliminate the use of diesel engines in light-duty trucks. By comparison, a standard of .4 gram would increase oil consumption by only about 50,000 barrels a day.

Would you comment on those studies? I think that was——

Mr. CURRY. DOE, Energy.

Senator WALLOP. DOE?

Mr. PLOTKIN. I am not familiar with these studies.

Senator WALLOP. What correlation internationally is there between CAFE standards in Japan and Europe and per capita fuel consumption?

Mr. PLOTKIN. Can you repeat the question?

Senator WALLOP. Well, the problem that we have is that we are being told that we are to compare ourselves with the fuel consumption habits with those of the Europeans and Japanese, and yet we have significant environmental standards that actually decrease the efficiency of engines over here versus engines in use widely over there.

So I am asking you if there is a correlation between our CAFE standards, the existing CAFE standards here, and Japan and Europe and per capita fuel consumption?

Mr. PLOTKIN. I guess I have to make a few comments. First, the Japanese and European fleets generally are more efficient than ours, but not by much. In fact, I believe the West German fleet is just about as efficient as ours. The Japanese is a few miles per gallon more. Most of the other European countries are perhaps 1 or 2 miles per gallon more.

Some of the difference in fuel consumption per capita is probably explained by simply driving a lot less than we do, rather than difference in the efficiency.

Senator WALLOP. Denser populations and smaller territories, with more accessibility to——

Mr. PLOTKIN. To transit.

Senator WALLOP.—to transit.

Mr. PLOTKIN. Yes.

Senator WALLOP. Thank you, Mr. Chairman. I will stop there.

The CHAIRMAN. Thank you, Senator Wallop.

Senator Bingaman.

Senator BINGAMAN. Thank you, Mr. Chairman.

Let me ask Mr. Curry, if I could. You have in your statement a statement here, you say you want to be fully informed about the potential effects of higher fuel economy requirements on the domestic automobile industry, which currently faces severe economic difficulties, intense international competition, and severe employment impacts.

I guess my question is, if the Congress were to adopt a system similar to the one Mr. Plotkin described, where you had the requirement for increased fuel efficiency tied to the size of the car, rather than to the corporate, rather than requiring each corporation to do that, does that solve your concern about our domestic industry being put at a disadvantage?

Mr. CURRY. It will help it a bit. But I would like to make just a broader answer, if I may. This particular method of looking at fuel economy in automobiles in terms of size is one of many that has been looked at for a long time. We are currently looking at that.

Some people wanted to look at the horsepower of a vehicle, measure it that way. Some would say curb weight. There are a lot of ways to look at it. Probably of all the ways to look at it, this is one of the less injurious ways, I think, to look at it.

I am not right now prepared to support that proposition and say that is it. I would much rather be in a position in my agency, since we are the ones by law who have to regulate this, I would much rather be in a position where the Congress turned to us and said, we require some improvement in the fuel economy and efficiency, and let us work it through our scientists and engineers to come up with the preferred method for doing that, rather than have the Congress legislate this specific way.

The Congress, for example, legislated specifically CAFE, which has turned out to have a very good idea, but has been very difficult in implementation and not rather fair in implementation. I have a sneaking feeling that for the Congress to legislate this particular method, we may find out 2 or 3 years from now we are back in the CAFE box.

I would much rather have the flexibility to move down a road, still though with the Congress requiring us to improve economy and efficiency.

Senator BINGAMAN. Are you suggesting that we should set a standard for fuel efficiency for the entire fleet and say meet it, and then leave it up to you to determine how to require different companies to make changes to accomplish that?

Mr. CURRY. I would much rather have the language that does not set that standard, which could be, one, arbitrary, and as you heard testimony this morning, maybe not even meetable. I would much rather have it that you would suggest to us that we do show a continued improvement and then let us work it through our system to see which is the best way of doing that.

Senator BINGAMAN. The problem I have to that is, we all want to go to heaven, as the saying goes, but it does not necessarily get you there to just say we all want to do that. If we do not have some target that we are aiming at or some incentive to move down the road or some requirement that we move down the road to a certain extent, I doubt that a whole lot of progress would be shown.

Mr. CURRY. Well, I think that Chairman Johnston said to us very clearly that he felt that we could work together jointly in some directions to come up with some reasonable approach. I think that we could find a reasonable approach.

Senator BINGAMAN. Do you think that this National Academy of Sciences study that you have commissioned will come back with a recommendation as to which of the various methods of achieving greater fuel efficiency is the preferable one in terms of not disadvantaging domestic industry or particularly advantaging any particular car maker? Is that part of their mandate?

Mr. CURRY. That is not part of their mandate, but I do believe they will provide to us the information on which those kinds of decisions can be based. And they are here today, of course, to represent themselves.

But I believe very clearly when the study comes in we are going to have very clearly what we believe in the administration is the necessary information to make those kinds of judgments.

Senator BINGAMAN. You also refer to this National Energy Strategy report and a recommendation in there for measures to promote the scrappage of older, less efficient vehicles. I am just not familiar with precisely what was recommended. How do you recommend we accomplish the scrappage of older, less efficient vehicles?

Mr. CURRY. In the National Energy Strategy itself, we address that position. I am trying to find my paper here that has some of the things, but essentially what it says to us is this—oh, here we are. Let me just read a little bit of it: "Significant accomplishments have been made in improving the efficiency of new vehicles and bringing the average new car up, as we know. Nevertheless, overall transportation consumption of oil continues to rise."

Even though CAFE has been in and some would say it helped us save energy over a 10-year period, at the same time our domestic consumption has still continued to climb. Perhaps it would have climbed more even without.

But the Federal Government believes that we should take a look at having incentives of some kind to get our oldest and dirtiest vehicles off the road. In terms of clean air, in terms of consuming fuel, one of the fastest, best things we could do—and we propose to work with the States to find out some kind of a way that we can encourage through a free market sort of thing, to encourage States, private individuals, corporations, to help us get some of the older gas guzzlers off the road, some of the bad emissions vehicles off the road.

We estimate that such programs could, getting the inefficient cars off the road by the year 2000, could do an awful lot for us. For example, early retirement of these gas guzzling vehicles could lead to savings of 10,000 to 15,000 barrels of oil a day.

Senator BINGAMAN. I understand what is said there, but I guess my question to you is what are you recommending we do to accomplish this? Are you suggesting we should penalize people for continuing to drive old cars or we should subsidize those who want to buy new cars?

What do you think we should do?

Mr. CURRY. Unfortunately, sir, you are asking the question just a couple weeks early. The administration right now is about to put together the final touches on that kind of legislative recommendation, and it is going to be made public. It could even come out as early as today, for example. But I am not prepared today to answer that for you.

I could answer it in a couple of weeks and I would be happy to provide for the record where we are, because I think we might have the information by that time.

[The information requested was not received at the time the hearing went to press.]

Senator BINGAMAN. Do you think there will be some kind of specific recommendation, either imposing penalties for old cars or providing subsidies for a purchase of new cars?

Mr. CURRY. I think we are going to very clearly show the direction and the kinds of programs that we would like and would support, and we would be happy to work with individual States to make that sort of thing happen.

The CHAIRMAN. If the Senator would yield, S. 341 has a scrappage provision funded by the penalties.

Senator BINGAMAN. Penalties?

The CHAIRMAN. That violations would pay.

Senator BINGAMAN. I see. Do we specify in there, Mr. Chairman, the amount of the penalties or how that would be administered?

The **Chairman**. We increase the amount of the penalties from $5 to $20. Of course, we do not know exactly how much that would yield. We hope nobody violates the specifications.

But that fund would be used to acquire the old cars.

Senator **Bingaman**. I need to review that. I am just not familiar with how that would work. That is a penalty that would be imposed on the driver who continued to use an older vehicle?

The **Chairman**. An automobile manufacturer.

Senator **Bingaman**. Oh, I see. I see, it is a penalty on the automobile manufacturer for failing to meet the CAFE standard?

The **Chairman**. That is right.

Senator **Bingaman**. Oh, I see. Well, I had misunderstood what you were recommending. I thought you were talking about incentives for people who were driving cars to get rid of the old ones or to get a new one.

Mr. **Curry**. We like the approach the chairman has given, but at the same time, as you know, there have been some private efforts in California where corporations have offered a bounty of, say, $700 if you turn in your gas guzzler that is 20 years old that pollutes the air. We will give you $700 cash or we will give you a $700 trade-in value. There are various programs like that that are being played with.

We think that that is a good private sector initiative. We would like those kinds of things to be expanded. We think they make sense and we think they help us solve our problem.

Senator **Bingaman**. Private sector initiatives, not subsidized with taxpayer money, I assume?

Mr. **Curry**. That is right.

Senator **Bingaman**. That is all I have, Mr. Chairman.

The **Chairman**. Thank you very much, Senator Bingaman.

Gentlemen, as you note, I am not calling time on Senators. That is because these witnesses I think are so important. I just want to remind Senators that we have another seven top-flight witnesses after that. So please do not ask unnecessary questions. With that, we will recognize Senator Burns.

STATEMENT OF HON. CONRAD BURNS, U.S. SENATOR FROM MONTANA

Senator **Burns**. Thank you, Mr. Chairman.

I am like Senator Bingaman, that I have not really looked at it on that scrappage thing. But it sounds like, if they are going to penalize, I qualify.

The **Chairman**. You or your car?

[Laughter.]

Senator **Burns**. I am still driving a 1976 Ford LTD. It is kind of a tank, but it saves kids, you know. And it goes. There is not too much pride in my family. I just worry about getting from A to B. I do not give a darn what I am riding in, as cheap as I can get there.

I am concerned, however, as we look at these CAFE standards, and I would ask anybody on this panel that going to those standards—and what I hear from Mr. Duleep, that we cannot meet that technology. And I am concerned in the area of light trucks, because all the information that we have been able to gather is that, with what Senator Bryan has got in his bill, there is not going to be any pickups, half-ton, three-quarter, on the market at all, at any price. Is that a correct assumption?

Mr. DULEEP. I believe the analysis that we did does show it is very difficult for such trucks to be sold. They would certainly have to restrict the product and they may go out of business on that.

Senator BURNS. Yes, go ahead.

Mr. CURRY. There is a very schizophrenic thing going on here. The schizophrenic thing is that as we make clean air improvements, which are very necessary, and look at it, there are costs because we add weight to vehicles and we put obstacles to technology in terms of fuel economy improvements. These weights and these things that we do to vehicles automatically reduce the CAFE standards, because it takes more gas to move that vehicle.

At the same time, my agency puts safety requirements on vehicles. That also adds weight. I just did it this fall with the side impact rule, which is a very important rule. That automatically degrades the CAFE standards.

So for an automobile manufacturer, whether it is Japanese, American, or European, just to keep even with 27.5, our standard today, has to bump up his fuel economy to do that, to make up for clean air additions and to make up for safety additions. So when we say we are going to hold it level at 27.5, that is an increase in CAFE at the same time that we are holding that level.

And then at the same time we have folks who are saying, in the future, 2001, we should go to 40 percent or more. As you have heard this morning, we cannot get there. We know what the known technology is through now to 2001. There is not going to be any great breakthrough of any kind.

These are going to be incremental improvements. We can do some things to improve fuel economy. We are not going to meet those targets of 40 percent. There is just no physical way for us to get there.

I have personally visited manufacturers in Europe, I have personally visited them in Japan, in Korea, all over the United States. I have sat down with their engineering departments. I have personally discussed fuel economy with all of these people, and there is not a manufacturer in the world who will stand up and tell us that we can meet those targets that are in the Bryan bill unless we get rid of your car—I happen to drive a Town Car—and get rid of my car——

Senator BURNS. I have never owned one of those.

[Laughter.]

Mr. CURRY. I got a deal for it—no, no—and go to cars that get 50 and 60 miles per gallon. And we have those cars right now, as you know. They are very, very light and you will not get your four children in with you, but you probably can move yourself around town, not too well.

Senator BURNS. You see, that is one of my concerns in this whole scenario, is how do we have trucks that move loggers and livestock and produce, not only from the farm to market, but from the market to the consumers. In other words, what I am hearing here is that we are going to end up with some little old rinky-dink thing, where you used to do it with one truck it is going to take three, and we accomplish no purpose whatsoever, we have not saved a darn thing.

I think our increase in consumption is reflected by the increase in population. The more people you have got, the more cars you have got on the road.

Now, maybe I am just a cow trader, no rocket scientist, but I can figure that out, and whatever we do on the CAFE. But I am concerned about the transportation, the commerce of this country, if we take all these medium-sized trucks that are used every day, even by the gardeners at this Capitol, in other words, they are not going to have those.

Mr. **Curry**. And the administration shares your concerns.

Senator **Burns**. I guess I have made my statement. I will end my questions there, but I think we have got a big, big problem.

Thank you, Mr. Chairman.

The **Chairman**. Thank you very much, Senator Burns.

Senator Conrad.

STATEMENT OF HON. KENT CONRAD, U.S. SENATOR FROM NORTH DAKOTA

Senator **Conrad**. Thank you, Mr. Chairman.

Let me come at this in a little different way. I for one think we have got to do something on CAFE. I asked the other day what percentage of our total energy use is going into the transportation sector, and the testimony was, of 85 quads of energy used, 22 is going in the transportation sector. And about all we have got from the administration is the suggestion we do another study.

Frankly, I do not think that is good enough. And if we are going to have a comprehensive proposal, one that deals with all of the problems and all of the opportunities, it seems to me we are going to have to do something with respect to fuel economy.

As an original co-sponsor of the Bryan bill, I recognize, as I think other co-sponsors do, there may be problems with that. The attempt there was to lay down a marker, to set some goals, and those goals can be changed and we can modify it to address problems that people have. But I do not know how you make any progress without goals.

Could I ask, Mr. Curry, when CAFE standards were initially put into place, could you tell us what the evaluation was in terms of the ability to meet those standards?

Mr. **Curry**. When the CAFE standards were initially put into place, no one really understood what they were looking at or what the future held. Great uncertainty. We have great uncertainty today, by the way. We were around 18 miles. We doubled that by the mid-eighties, and I need to give a footnote to that.

To double that increase in fuel economy, 50 percent of that increase came through technological improvements, 50 percent of it came from taking on the average 1,000 pounds per car out of the weight of vehicles. That 1,000-pound weight reduction translates directly into about 1,300 deaths a year, about 6,300 serious injuries a year.

I believe we should not repeat that mistake in the future. I believe we can get fuel economy gains in the future, between now and 2001. I think we can do it without hurting people, and I believe that that is the marker that I would like to see laid in the sand for me by Congress, to say: We will push you to get maximum fuel economy, but we are not going to cross the line if it means we are going to injure or kill people on our highways.

Senator CONRAD. Well, I like that marker as well in terms of safety. I think, obviously, all of us want that. All of us want to protect the domestic automobile and truck industry to the degree that is possible.

We also have a problem. The reason we are all joined here together today is because we have got a problem in our country. The problem is we are importing about half of the fuel that we use, about half of the oil that we use, and about 40 percent of the oil use is for motor vehicles in this country. And if we do not do something significant there, not much is going to happen.

Let me ask Mr. Plotkin or whoever else would be interested in responding to this question. If you read the language that is in the Johnston-Wallop bill—and I have applauded the chairman on previous occasions, as well as the ranking member, for I think the excellent job they have done in giving us a package to start with. When you read the language with respect to CAFE standards and look at maintaining 1990 performance levels and maintaining 1990 size mix, but requiring the technology that is available, what kind of an increase in fuel economy do you anticipate we could achieve?

Mr. PLOTKIN. We have done a number of studies, or at least Duleep has done a study that we have used, and we still are running scenarios. So our final report will not be out for a couple of months.

But I am willing to say that in the 1995-1996 period numbers around the order of 30 miles per gallon seem achievable. In a later time, in the year 2001-2002, there are a number of different scenarios which need careful interpretation.

In fact, one of the problems has been numbers are being used without very carefully explaining precisely what they mean.

Senator CONRAD. Let me just intercede right there. The 30 miles per gallon that you have just referred to would be achievable in the 1996 time frame or the 2001 time frame?

Mr. PLOTKIN. In the 1996 time frame.

Senator CONRAD. In the 1996 time frame. Well, that would be even better than what is called for in the Bryan bill.

Mr. PLOTKIN. The Bryan bill calls for 34 miles per gallon.

Senator CONRAD. In the 1996?

Mr. PLOTKIN. Yes.

Senator CONRAD. So you would be at 30, and in 2001 where would you be?

Mr. PLOTKIN. First of all, let me say again, there are a lot of ways to game this. For example, I could quote a number that the companies could then achieve without actually getting to that level of fuel economy, by amassing credits of one sort or another. The most obvious one is the alternative fuel credit.

So that again, if I were to answer they could achieve a 36 or 37 miles per gallon standard, that might not mean that the fleet would actually get that high a fuel economy, because they could get there with a couple of miles per gallon with dedicated vehicles or whatever.

Senator CONRAD. Right, all right.

Mr. PLOTKIN. Certainly the numbers are hovering around the middle thirties, in that range, although again in a couple of months I will have better numbers for you.

Senator CONRAD. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you. Senator Nickles.

STATEMENT OF HON. DON NICKLES, U.S. SENATOR FROM OKLAHOMA

Senator NICKLES. Mr. Chairman, thank you very much.

First, I wish to applaud you and Senator Wallop for the bill which you have introduced. I think it is a big improvement over the alternative that we have heard discussed on the floor last year, the Bryan bill.

I myself would very much like to see improvements made in fuel economy. I just do not want to have mandates that I see have very negative results on the economy and on consumer choice. We can meet the 40 miles per gallon standard; it is just a question of whether or not that automobile meets consumer needs, and frankly it does not.

The net result would be, since consumers would not want to buy or they are proving right now that they do not want to buy that very small, very fuel efficient automobile or truck or whatever the case may be, they would not buy it. And when they do not buy it, they are going to maintain those old gas guzzlers. I have got one that I would be happy to sell for $700.

So the net result is we are not going to have the fuel economy. We cannot pass a wand that says it is going to be 40 miles per gallon. We may be able to pass a law, but I do not think you can mandate or dictate to consumers that they have to buy a particular size automobile that will not meet their desires or their wishes.

The net result will be, if we pass that law, I think we would be passing a law that would be very detrimental to the health of the domestic automobile industry and all the related and associated industries. When you look at the current health of the domestic automobile industry, I think this would be a very poor time to do that.

The Big Three, as you might say, are going through some difficult times. They are already laying back, they are already at a very small percentage of capacity, manufacturing capacity. So to put on a mandate which would basically be dictating to consumers smaller type automobiles, which they by choice decided that they did not want, would cost jobs, thousands of jobs, and hurt an economy that is already very fragile.

I do not think that is a wise thing to do. And as Mr. Curry said, I also see it as increasing the number of fatalities, decreasing safety for individuals.

So I think the Bryan bill, Mr. Chairman, would be a serious mistake. I think your proposal or approach is a much-needed improvement and so I compliment you and Senator Wallop for that improvement.

[The prepared statement of Senator Nickles follows:]

PREPARED STATEMENT OF HON. DON NICKLES, U.S. SENATOR FROM OKLAHOMA

Mr. Chairman, let me begin by congratulating you and Senator Wallop for developing a common-sense approach to the CAFE issue. The current CAFE law is an expensive, inefficient and invasive mechanism that has, by itself, produced little overall automobile fuel efficiency but has contributed to a weak domestic auto industry and, at least indirectly, to higher highway fatalities.

The proponents of higher CAFE standards insist that if Congress waives a magic regulatory wand, the automakers will invent technology that will give us roomy cars that get 35 or 40 miles per gallon. After all, proponents argue, "We can make smart bombs, why can't we make fuel efficient cars." Well, we can, and we do. There are six models of cars that are rated at over 40 mpg available today. However, less than five percent of car buyers want them. Could we make 40 mpg, full sized cars? Quite possibly. But price will certainly be a restraining factor. I want my colleagues to note that the Desert Storm Supplemental Appropriation request indicates a single 2,000 pound, "smart" bomb (GBU-15) costs $455,333. I think cars are already too expensive. The average car sold in 1990 was $16,017, of which over $2,500 is already the direct result of federal safety and pollution regulations imposed since 1968, not counting the hundreds of dollars that the new Clean Air amendments are expected to add.

The proponents of higher federal CAFE standards also argue that we Americans must "change the way we do business" and accept a lower standard of living, lower mobility and less safety on the highways. I want to see higher gas mileage, but I firmly believe that Congress should not mandate the size of car Americans must buy. It is particularly important that Congress not be tempted to force Americans into small cars given the National Highway Traffic Safety Administration finding that the occupant death rate in the smallest cars is double the rate for the largest cars. Thus, the effect of Americans buying smaller cars has been to increase the highway deaths by several thousand per year. Passage of a well-meaning CAFE increase would inadvertently be an accessory to the crime of killing thousands more Americans every year. There are, simply put, a number of competing interests that need to be considered along with the goal of decreased petroleum usage.

Finally, proponents of higher CAFE standards hide behind the structure of the CAFE approach: force the automakers to sell cars that meet certain fuel efficiency averages and the automakers will have to figure out how to get the American people to buy these uncomfortable, relatively unsafe, tiny cars. Despite aggressive advertising and low-profit sales margins, less than five percent of American carbuyers have been purchasing cars that have a fuel-efficiency of greater than 40 mpg.

And lets look at the CAFE issue in context: the current recession has deeply hurt the domestic automobile industry. The domestic automakers have less money for subsidizing and advertising lower mpg cars, and less money available for R&D. The lack of resources is becoming acute in the auto industry because of the very significant demands being placed on fuel and engine system redesigns by the recently enacted Clean Air Act Amendments, and by increased safety regulations being imposed by the National Highway Traffic Safety Administration. Moreover, these two regulatory goals—less air pollution and more safety—complicate the goal of maintaining even the current CAFE standards. New side panels add weight and thus reduce mileage. Meeting more stringent nitrogen oxide emission limits will tend to lower combustion temperatures and hurt fuel efficiency.

The realities of the marketplace and the lessons we have learned should give us enough hindsight to avoid making the mistake of Congress setting arbitrary CAFE standards. The bill introduced by Senator Bryan, for example, would require a 40% increase in a manufacturer's fleet average between now and the model year 2000. Even if his bill passed this year, that would be eight model years away. During the past fifteen years, domestic manufacturers have doubled the mileage of their fleets. Due to aggressive weight reduction (GM claims to have taken a thousand pounds off of the average car), more efficient engines and tires, front-wheel drive, computer-controlled fuel injection and aerodynamic styling, this fuel efficiency increase has not caused a reduction in interior room. However, most of the cost-effective measures have already been used to increase fuel efficiency. Where is the dramatic fuel economy increase envisioned in the Bryan bill going to come from? It will come predominately from further downsizing, which will give the large cars of the next decade the size, comfort and safety of today's 2-passenger Honda CRX.

Mr. Chairman, the directed rulemaking approach taken in your bill injects a large dose of common sense into this CAFE debate. Your approach sets the stage for establishing practical criteria for a rulemaking by the appropriate agency, rather than having members of Congress simply pull mileage numbers out of the air and put them in binding legislation.

I wish to inform the Chairman and my colleagues that I intend to offer an amendment to this provision when it is considered by the committee. The amendment would add a new assumption to guide the rulemaking process by the Secretary of Transportation. The Secretary would also assume that vehicles of a particular class will not cause any greater highway fatalities than model year 1990 levels. I am concerned about the demonstrated increase in traffic fatalities in small cars versus larger cars, and I do not believe it is appropriate for the Congress to mandate Americans die on the highway by the thousands to gain a marginal improvement in overall energy efficiency.

Senator NICKLES. Mr. Curry, just to ask you a question. You mention the fact that many of the automobiles over the last decade or so have reduced weight, maybe an average of 1,000 pounds. I do not even know what automobiles weigh, but can you get another 1,000 pounds out of the automobiles that are being made in 1991 by the year 1995? Can you take another 1,000 pounds off?

Mr. CURRY. You could do that, but they would be two-passenger cars, very small, very light, mini-cars.

Senator NICKLES. A two-passenger car, is that rather difficult for a family of six to fit in, a two-passenger car?

Mr. CURRY. I am afraid the families of six would line up at my door with baseball bats.

Senator NICKLES. I understand.

What about—I mentioned fatalities and you are in charge of that or involved with that——

[Laughter.]

Mr. CURRY. I have been trying to dodge that for 2 years.

Senator NICKLES. You are directly responsible for all those fatalities.

[Laughter.]

Senator NICKLES. You have called for some increases in weight standards, I guess, for the——

Mr. CURRY. Side impact.

Senator NICKLES.—side impact resistance. How much has that increased the weight?

Mr. CURRY. Less than one percent, less than a half really, about .04, somewhere around there.

Senator NICKLES. The Clean Air Act changes that were made last year, they add some additional weight. Do you have figures on that?

Mr. CURRY. Not yet, because really legislatively that has not been laid out clear enough to have them. But someone mentioned 7 percent. I agree with Steve Plotkin, I think 7 percent is high. It is going to be much lower than that. But it clearly is going to add some increased fuel consumption.

Senator NICKLES. Mr. Plotkin, some of the clean air amendments that were made last year also require greater refinement of gasoline, if I am correct, and I believe take a greater amount of raw material, petroleum, to make the reformulated gasoline and so on; is that correct?

Mr. PLOTKIN. It may take a higher total energy, but I do not believe it will take more oil, because there will be some substitution of products that are made from natural gas or with ethanol as well, ethanol and MTBE, which is made from natural gas.

So the net effect should not be an increase, I believe, in petroleum use.

Senator NICKLES. Well, I do not think you are quite correct. You might be correct in regard to that additive in particular that is made from the natural gas, but I believe that some of the requirements to take some of the additional impurities out of the gasoline, it takes a little more of a refining process to get there, so you are losing some of the oil in the process. Maybe I am incorrect.

Mr. PLOTKIN. I think that it is true that you lose some there, and you gain some back from the additives. What the net effect is I am not sure, but I would be surprised if the net effect was—in fact, I think this was sold, this whole idea of reformulated gasoline with ethanol or MTBE oxygenates was sold, as one way of slightly reducing oil requirements.

Senator NICKLES. One final question to both of you. If the Bryan bill passed as it is, do you see the result of that as decimating the domestic automobile industry, if we passed it as is to meet that 40 percent improvement by the year 2001?

Mr. PLOTKIN. First of all, I think the Bryan bill will cause problems for everybody. I would think it might cause more problems for the Japanese than it causes for the American manufacturers. The question is what do they do? If they cannot get there, then they will violate the bill and pay the penalties.

I would guess that actually the Japanese might end up paying more than the domestics.

Senator NICKLES. My question was what the result would be on the domestic automobile industry if these standards are not really achievable. If you cannot take another 1,000 pounds off the automobile, would it decimate the industry?

We already have a very fragile industry, as I hope that you are aware. Maybe you are not aware, but if you read the newspapers there is a lot of plants that are being curtailed, layoffs, percentage of capacity. Profits are down, et cetera.

Could the domestic automobile industry meet the Bryan standards and still survive as the large, big part of American society, industry, jobs, that it is today?

Mr. Curry, Mr. Plotkin is having a hard time answering that.

Mr. CURRY. The short answer is no. We will not have a domestic automobile industry as we know it today if we take 1,000 pounds out of cars through the Bryan bill. I would hope that that is not the direction the Congress is going to move.

Senator NICKLES. Thank you, Mr. Curry.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Akaka.

STATEMENT OF HON. DANIEL K. AKAKA, U.S. SENATOR FROM HAWAII

Senator AKAKA. Thank you very much, Mr. Chairman.

Your last answer, Mr. Curry, sort of knocks my questions out, when you answered no. And many of the questions that were asked already have been questions I wanted to ask. So Mr. Chairman, I will just cut it by maybe laying it in your laps, yours and Mr. Plotkin's, that what is being legislated here is saving energy and making it safe so that we can reduce the traffic deaths.

You have made, Mr. Curry, comments about that there are 1,300 deaths since 1975 due to small sized cars. What size cars are you talking about when you refer to the 1,300 deaths?

Mr. CURRY. It is not a specific car. What happens is we do an engineering study and it is called Car Size and Weight Study. There is another one coming out, by the way, in April. And what it looks at is—and this will sound like a ridiculous answer; it is not meant to be ridiculous—if you take a tank in the Middle East and run it into a jeep in the Middle East, the jeep loses and the occupants lose.

So just across the board, as you reduce the weight in cars the incidence of those cars protecting their occupants is decreased or degraded to some degree.

Now, I think the other question that could be quickly ask is, are all little cars unsafe? The answer is no. With lots of improvements, such as air bags, seat belts, and many other things that we do to them, all little cars, whether they are made in America or made overseas, meet the minimum safety requirements.

But physics tells us that you are just better protected in a larger vehicle than you are in a smaller vehicle, particularly if you roll over or hit a tree, for example.

Senator AKAKA. I am interested in your expertise when you say that you have worked on the side impact dangers of the car. My interest there is there are other parts of the car, such as the front and the rear.

Mr. CURRY. Yes.

Senator AKAKA. Can you compare those different sizes of cars in terms of their impacts and the dangers?

Mr. CURRY. As you know, if you have a larger car with more mass out in front of you, and let us say you run into a tree, for example, the car is built and is of such a size that it absorbs the energy as it crushes before it gets to the driver and the passenger.

A smaller car has less of a front out there, so as you run into a barrier of some kind then you have less distance and you have less strength to absorb the energy, so the passenger and the driver absorb more. But there are many things that have been done with cars, small cars, to make them safer than they would be if you did not have those improvements.

Senator AKAKA. Yes, Mr. Plotkin?

Mr. PLOTKIN. I think it is important to make one comment about this whole safety discussion, and that is reducing weight per se does not have to compromise safety. It depends on how you do it. If you do it by taking away structure and structural integrity, then clearly you are going to degrade the safety of the car.

If you do it by changing materials and if you compensate with lighter but stronger materials and new designs and honeycomb-type materials, et cetera, you can retain the same safety. So that both happened. We had both shorter cars with less crush space and we also had better designs, and all of that weight reduction, every bit of it did not degrade safety. Only that portion which was a shortening of the amount of crush space degraded safety.

So that there is still potential for weight reduction which will do really basically nothing to degrade safety. It is important to remember that.

Mr. **Curry**. Steve and I would agree and disagree. We would agree that what he said is absolutely true to a degree in terms of weight. But when you are talking about 1,000 pounds, this does not apply. If you are talking about less than that, some 100 pounds or so, yes, that is true.

But there is nothing you can do to restructure a car in terms of changing the materials and take 1,000 pounds out of it. That is not going to work.

Mr. **Plotkin**. We do not disagree.

Senator **Akaka**. Before I leave that front, side, and rear impact, what percentages of accidents occur in these different areas?

Mr. **Curry**. Somebody will probably hand me the answer to that, but while they are doing that I can generally put it in——

Senator **Akaka**. Well, you just provide it for the record. That will be fine.

Mr. **Curry**. I would be happy to.

[The information requested was not received at the time the hearing went to press.]

Senator **Akaka**. Finally, we are trying to see, as I said, answers to help the public so we can have safe cars and use less fuel. What is being proposed here by Bryan—and I have heard an answer here. My question to you is, do you have, coming from your expertise in your agencies, answers to the question of safety and fuel efficiency that can help the public by the year 2000?

Mr. **Curry**. I do not have the figures right now, but that is why we did the contract for the NAS study with the National Academy, because we believe they will give us the information we need to answer some of these problems.

Senator **Akaka**. I appreciate your responses.

Thank you, Mr. Chairman.

The **Chairman**. Thank you, Senator Akaka.

Is Senator Craig here?

[No response.]

The **Chairman**. Senator Murkowski.

[The prepared statement of Senator Murkowski follows:]

PREPARED STATEMENT OF HON. FRANK H. MURKOWSKI, U.S. SENATOR FROM ALASKA

Mr. Chairman, this country has used CAFE standards for many years as a tool to reduce our nation's consumption of gasoline. Congress first enacted fuel economy standards in 1975. Since then the standards have doubled and it can be argued that we have consumed less gasoline as a result.

However, we must be careful not to let the apparent success of CAFE standards in reducing gasoline consumption blind us to other effects of CAFE standards. To assume that since CAFE standards were effective in the past, they will be equally effective in the future may be a dangerous assumption. It makes me think of the old adage. One feather floats to the ground, but a bagful of feathers falls like a rock.

When the auto industry responded to the first CAFE standards in 1975 there was room for technological improvements in the automobile. More efficient engines, stronger and lighter components, and advanced aerodynamic designs all contributed to increased fuel economy. Today, sixteen years later, significantly improving fuel economy may be much more difficult to achieve. We need to consider what technologies are available and the lead time necessary to introduce them, what market barriers exist, the effect of Clean Air Act emission standards, among other things.

Ultimately, this debate raises issues of reduced passenger safety and decreased consumer choice. These are very important issues that should be carefully examined. The quest for fuel efficiency must have reasonable bounds. Efficiency should never be at the risk of health or safety. And efficiency at the expense of consumer choice is certainly worthy of additional examination and debate.

I applaud the intent of this hearing as we examine these issues and look forward to the testimony of our witnesses today.

Thank you, Mr. Chairman

Senator MURKOWSKI. Thank you, Mr. Chairman.

A couple of quick questions. Secretary Watkins testified in the hearing before this committee that, even if we could average 40 miles per gallon for new cars in the year 2000, oil savings in the year 2005 would be about 500,000 barrels per day. Now, that is in contrast with Senator Bryan's bill, which I think indicated that 2.8 million barrels per day would be the achieved savings by the year 2005.

I would like your professional opinion as to who is right.

Mr. PLOTKIN. Senator, who is right depends on what you assume would have happened without the legislation.

Senator MURKOWSKI. Well, you assume without the legislation that you would not have saved 500,000 barrels a day or 2.8 million barrels a day, because that is what we are looking at.

Mr. PLOTKIN. I think we need to do this calculation, and I would be happy to do it, with some assumptions, and get the answer back to you. But I must say, offhand, 500 sounds pretty low.

[The information requested was not received at the time the hearing went to press.]

Senator MURKOWSKI. Okay.

The CHAIRMAN. If I may interrupt at that point to ask, if you would, Mr. Plotkin, with Mr. Duleep do that calculation and furnish it for the record. And Mr. Curry, if you would do that as well. And we also welcome for the record anybody else who is in the audience who would like to do it for us as well; we would like to receive that.

Senator MURKOWSKI. Thank you, Mr. Chairman. You have taken some of the words out of my mouth. No one else has an offhand—the difference is so substantive that I think it obviously deserves a professional evaluation. Would you agree?

Since the Secretary's, I assume, testimony bears some background, evaluation, and expertise, and I would assume my colleague Senator Bryan's does, too, but the difference is just too large to leave laying.

You gentlemen have made, I think, a case for the issue of safety, which we are all concerned about, particularly if the structural integrity has to be removed to achieve the savings that we are trying to achieve here. My question is one that goes into, I think, the bottom line liability. Are we going to find automobile manufacturers willing to make cars that are going to increase the likelihood of fatalities and stand the gaff of the liability associated with that?

We see lawyers working on full employment contracts all the time that are willing to take cases that indicate that the automobile is not safe, and the jury has to decide what is safe and what is not. But you are telling us that to achieve these you are going to have to reduce weight, we are going to have to approach structural integrity, you are going to be able to address air bags and other things which compensate for that.

But to get this mileage increase, are you going to have automobile companies in the U.S. willing to make a vehicle that is going to expose them to an extended liability as a consequence of a forecast of increased accidents?

Mr. PLOTKIN. I have a couple of points, Senator. First, during this time period when we experienced this estimated 1,300 deaths per year, I believe that, despite the downsizing, that because of the changes in technology, the fleet is considerably safer, although smaller. That is, that this question, the answer is posed in the sense of what we would have achieved had we done nothing, had we not had the CAFE standards and had continued with larger automobiles, we would have had even a slightly safer fleet.

So it is a question of a tradeoff, rather than a net loss of safety. I think everybody would agree on that.

As far as the longer term, I believe that estimates of the necessity for a 1,000 pound reduction in vehicles to reach, say, the 2001 standard is excessive. I think that that number is just taken out of the air and it is too large.

Mr. CURRY. I agree with that, by the way. I think the number is too large.

Mr. PLOTKIN. And I ~~am~~ not convinced that we could not achieve such a standard, especially for the longer term, perhaps backed off a few miles per gallon.

Senator MURKOWSKI. Whose standard are you talking about?

Mr. PLOTKIN. I am talking about the Bryan standard. 40 miles per gallon might be too high, and I think it is important to look very carefully at these numbers. But if you are talking about a standard something a bit lower in that time frame, I think that you could have safe cars and achieve such a standard.

I think it is not really reasonable to argue that all of a sudden the American manufacturers are going to be building death traps.

Senator MURKOWSKI. No, I concur. I guess it would be interesting to hear from the automobile manufacturers on the point of what they consider their expanded or extended liability as a consequence of having the lighter car, which may or may not be a greater risk to a driver or passenger.

But I think it is important to recognize also that the first CAFE standard bill, enacted in 1975, required a comprehensive 18 miles per gallon by 1978. Now we are looking at achieving—we are now at 27.5.

The concern I have is what do you consider maximum feasible fuel economy? In other words, what does it mean to you? What does that term mean? We have made progress. How much more progress can we reasonably make, is what we are all interested in knowing.

And we use the term "maximum feasible fuel economy." The Bryan bill would bring this up to, what, 34 miles per gallon by 1996 from, I gather, 27.5 now. But what does "maximum feasible fuel economy" mean?

Mr. PLOTKIN. Actually, Senator, the Congress in some ways must define that, because many of the factors, like economic practicability and things like that, are not something that a technical analyst defines. All we can do is to show you what the consequences would be in terms of what the fleet looks like for different fuel economy numbers.

Senator **Murkowski**. So you are saying basically Congress is going to set what it means and then the question of what the fallout is is anybody's guess.

The last question, Mr. Chairman—you did not say that?

Mr. **Plotkin**. No, sir, I did not.

Senator **Murkowski**. What did you say?

Mr. **Plotkin**. I said that we can show you what the consequences of different definitions of what you mean by "practicality," by "safety," will be. That is, if you require certain things, certain impacts to be held at a level, we can tell you what kind of a fuel economy could be achieved under those conditions.

But then it is up to you to decide which of those scenarios sounds most reasonable and for you to select that one.

Senator **Murkowski**. And that basically makes up the axiom of the "maximum feasible fuel economy" applicable?

Mr. **Plotkin**. Yes.

Senator **Murkowski**. Last, the question of the ability of the domestic market to achieve the standards or the Bryan bill for that part. I am concerned since I think there is a general assumption that the foreign market, particularly the Japanese, have led to greater fuel economy, utilization, and technology.

But my specific concern is can the foreign imports achieve a more realistic ability to adjust into these new standards than the domestic market, in your opinion, or is it in types of vehicles? Obviously, they led the way into the smaller, more fuel efficient vehicles being introduced. Then the domestic producers developed a competitive counterpart to that. But we do not see it in light trucks.

So is it in categories, or does the foreign market basically run up against the same inability to meet these standards as the domestic industry, so that it is really a tradeoff, we are not providing if we adopt something approaching the Bryan bill an opportunity for foreign participation to take a greater share of the market?

Mr. **Plotkin**. I would like to answer that the best I can and then ask Mr. Duleep to add something if he would like. My feeling is that there are two forces operative here. One is that the Japanese manufacturers have a shorter turn-around time for bringing out new models at the moment than the domestic manufacturers do. So that if you give a very short time frame to achieving these standards, you would give in that regard an advantage to the Japanese.

On the other hand, the uniform percentage increase standards are more difficult for the Japanese to meet with the same technology, because in a sense their baseline is a little ahead.

So whether those two things balance each other I cannot say, but they do work in different directions.

Senator **Murkowski**. Thank you, Mr. Chairman.

The **Chairman**. Senator Bradley.

Senator **Bradley**. Thank you very much.

The **Chairman**. Wait a minute. I think Senator Bumpers was first. I am sorry.

Senator **Bumpers**. Mr. Curry, the other day Secretary Watkins was here and he expressed the view of the administration that they are opposed to any increase in the CAFE standards. Is that the position of the Department of Transportation?

Mr. **Curry**. I think his approach to it was, in terms of looking at CAFE itself sort of in splendid isolation, the administration would like to do whatever is possible to do technically to increase fuel economy, fuel efficiency. We are not enamored of the CAFE approach to it, and the answer is yes. That is the reason we would just as soon not fiddle with that at all right now.

Senator **Bumpers**. Well, what are you enamored of?

Mr. **Curry**. Well, we are enamored with a couple of things. One of them is that we have already committed ourselves to supporting increased fuel economy and efficiency. The National Energy Strategy moves in that direction and you have heard the Secretary of Energy, and I certainly cannot improve on his testimony or the Secretary of Transportation's testimony.

We have asked the National Academy of Sciences to help us do a study, only because we felt that there are some things that can be done, but they need to be done reasonably and proper, and we need not to precipitously move down the road. But clearly, the administration is in favor of increased fuel economy.

I cannot give you the legislation for that today, but that is being worked on and the administration's position on legislation will be coming out shortly.

Senator **Bumpers**. Well, Mr. Curry, the administration favors a balanced budget, but we are looking at a real deficit this year of about $500 billion, and I do not know of a single suggestion that has been made by anybody about what to do about it.

Mr. **Curry**. Sir, I am certainly not qualified to go down that road.

Senator **Bumpers**. You are not going to catch anybody on this side of the chairman proposing a tax increase. You are not going to catch them proposing much of anything unless the President is on board, because he is the big guy on the block in that department.

But when it comes to CAFE standards, when you look at this thing which I just stole from Senator Wirth, when you look at the static trend line of the United States in fuel efficiencies, we have made no progress in the last 4 years and very little since 1985.

If you look at this morning's Wall Street Journal, you will see where oil prices through the next 2 years in futures are estimated to be around $18 a barrel. I just do not understand Secretary Watkins', for example, suggestion that we are going to reduce consumption by 3.5 million barrels a day from what it would otherwise be without CAFE standards. There is absolutely no empirical proof that people are going to use less fuel.

I have seen analyses by pretty reputable oil analysts who say that the possibility of five dollar oil is not out of the question, and certainly it will be whatever OPEC says it will be. So when we talk about a National Energy Strategy that is going to make us energy independent, but we are not going to require people to do anything, it is just simply not going to happen.

I do not like it. I do not like CAFE standards.

Let me ask you. I think maybe you testified on this earlier, Mr. Curry, about the safety standards. I think you said that we had made safety gains due to highway improvements, but that you had studies showing that the smallness of the cars actually increased deaths on the highway; is that correct?

Now, does that take into consideration mandatory air bags? I think this question has already been asked.

Mr. CURRY. It takes into consideration seat belts, mandatory air bags, any safety devices. It is a tradeoff. Without question, in a smaller car with air bags and seat belts you increase safety and reduce deaths. At the same time, if you take 1,000 pounds of weight out of the vehicle you increase deaths. So you have a tradeoff.

Senator BUMPERS. Well now, this chart shows, for example, that France, Italy, and Sweden, and I am sure that there are a whole host of other countries that have much better fuel standards than we have. In other words, their fleet average, mandatory or otherwise, is considerably higher than ours.

What are the safety rates in those countries compared to ours? They obviously are driving smaller cars.

Mr. CURRY. I do not have the figures, but I can tell you—I can give you that for the record, but I can tell you without qualification that the United States of America has the safest highways in the world, worldwide. We measure them in 100 million miles driven, and without question ours right now is 2.1 and it is lower than any other country in the world.

Senator BUMPERS. Well, why is that not a pretty good recommendation to continue with CAFE standards, then, if we are already the safest Nation on earth?

Incidentally, there has been no change in the volume, that is the interior volume, of automobiles under the CAFE standards, has there?

Mr. CURRY. I believe the answer is yes, there has been a downsizing in the interior volume, trunk size also, and in the front of the car.

My job as the Administrator of the National Highway Traffic Safety Administration, my job is to save lives, and I just, because of the nature of my job, I have difficulty trading off safety for fuel economy.

Senator BUMPERS. Well, in a perfect world I might, too. But it seems to me that what we have here is a National Energy Strategy that is calculated to assure continued dependence on Middle Eastern oil, and continued dependence on Middle Eastern oil may mean another war, two more wars, or God knows how many more wars.

That is what this is all about. That is what generated all this excitement, the nagging suspicion by the American people that we are really in the Middle East because of oil.

Well, if oil goes to $10 a barrel, what happens to fuel efficiency standards in this country? Well, better, let us assume that the futures people who are buying futures right now are right, that oil is going to be $18 a barrel 2 years from now, and you have got this evidence that we have made no improvements for the past 4 years. What happens?

Do we reach this 3.5 million barrel reduction per day?

Mr. **Curry**. I am not an expert in the National Energy Strategy in terms of that kind of consumption, but I think I can relate it to my narrow area, which is safety, and the relationship is a very straightforward relationship. Even though we doubled the fuel economy of motor vehicles over the period of, say, 1972 to 1982, even though that doubled, at the same time the amount of energy America was using went up.

There is no indication that if we double it again that fuel energy will not continue to climb in terms of consumption. So the point that if we double this we would significantly reduce our dependence on oil, I am not sure that I am able to make that connection.

It certainly will help us, but I am not sure that is our salvation. I think the National Energy Strategy is broader and it does help us down some roads that perhaps may lead us in the right direction.

Senator **Bumpers**. What if we do nothing on CAFE standards and just say, since the automobile manufacturer likes big cars and there are certain people in this country who like big cars—my mother and father were killed in a car wreck and my brother took a vow at my father's funeral that he would always have a bigger car than anybody else on the road, and he has kept that vow. But he is rich. I cannot afford those big cars, but the automobile industry loves them.

Now, what if we were to put a penalty on people who buy a car that exceeds the present CAFE standards? Incidentally, we are not even meeting those now. We are well below the 27.5 miles per gallon mandate now.

But what if we were to put a $100 penalty on each mile per gallon an automobile exceeded that, it goes into a trust fund, and parcelled it out to people who buy cars that are over that standard?

Mr. **Curry**. There is already a penalty in law.

Senator **Bumpers**. I said over; I meant under for big cars.

Mr. **Curry**. There is already a penalty in law for people who are not able to meet, bring up their average fleet to that level. For example, every year my agency sends a letter to European car companies and some American car companies and says: You have not made the fuel level; therefore, you are assessed the following penalty. For example, last year Mercedes-Benz paid the United States Government $20 million in penalties for that.

In addition, as you know, there is a gas guzzler tax on top of that. In addition to that, we now have an added luxury tax on top of that.

Senator **Bumpers**. This all goes into the Treasury.

Mr. **Curry**. Yes.

Senator **Bumpers**. I am talking about putting it into a fund and rebating it to people who are willing to buy smaller cars. I notice Honda has got a 65 miles per gallon car they are just getting ready to come out with. Do you have any problem with that?

Mr. **Curry**. I would not feel comfortable commenting on that. But I have to sort of correct the record a bit and say to you that on the average in 1991 CAFE is running about 28.2 miles per gallon, and that is an increase one-tenth of a mile per gallon from last year.

Senator **Bumpers**. Where are you getting that figure?

Mr. CURRY. I beg your pardon?

Senator BUMPERS. Where are you getting that figure?

Mr. CURRY. We maintain the figures along with EPA and Federal Highways on those. We can make them available for the record, with all the background on where it comes from. We would be happy to make that available to you for the record, sir.

[The information requested was not received at the time the hearing went to press.]

Senator BUMPERS. Is that for new cars?

Mr. CURRY. Yes.

Senator BUMPERS. All new cars?

Mr. CURRY. Yes. Here we go. It is reports from manufacturers, and then that of course, as you know, is verified by the EPA later on.

Senator BUMPERS. And you are saying that our national fleet average right now is over 28 miles per gallon?

Mr. CURRY. Of the cars being sold in America now. That is nationwide. We have shown an improvement in domestic cars and in foreign cars both. It is slightly creeping up.

Senator BUMPERS. Is that true of American automobile manufacturers?

Mr. CURRY. They are not at that level. That is averaging all cars sold in America. I can give you the domestic numbers.

Senator BUMPERS. What are they?

Mr. CURRY. They went from 26.9 to 27.3.

Senator BUMPERS. This past year?

Mr. CURRY. Yes.

Senator BUMPERS. That is gratifying to know. I had not seen it.

Mr. CURRY. We have all of that available.

I think we should insist on increased fuel economy and efficiency. I think that we can get that.

Senator BUMPERS. But you are not giving any way to do it.

Mr. CURRY. I think we can do it as long as we do not hurt people, and I have said to you that we very clearly have felt that we need to move in that direction. That is part of the reason that we commissioned this National Academy of Sciences study, and the administration is going to take a look at the results and we are going to move in that direction, because we think it is important to America.

Senator BUMPERS. Mr. Chairman, I will not take any more time. I do not know how you move in that direction without some kind of plan for moving in that direction, and if you are going to move in that direction and you are not going to take into consideration the fluctuation of oil prices by OPEC, you are simply not going to move unless OPEC puts oil up to $40 a barrel.

Now, if you want to encourage them to do that, that will certainly improve fleet standards in this country.

Mr. CURRY. Well, work is being made in the plan to move in that direction. I do not have the legislative language today, but there is effort going on right now within the administration to come up with a plan to handle this particular area, and we have said so, that we are doing that.

Senator BUMPERS. Mr. Chairman, I also want to say I think that Senator Bryan's bill may be a little overly ambitious. I think that point has been made here this morning. I am a co-sponsor of it and I certainly am willing to talk further about that based on the testimony this morning.

The Chairman. Senator Bumpers, the staff has just handed me some figures here which I think are very interesting. The EPA study shows that from 1975 to 1980 the size of cars came down almost 1,000 pounds. Since 1980, they have been within 100 pounds of, in effect, almost no change.

But since 1980 the MPG average has gone from 20 miles per gallon to almost 28 miles per gallon. So that the improvement in the last 10 years has been technological. That is correct, is it not? Senator Bradley.

Senator Bradley. Thank you very much, Mr. Chairman.

Mr. Curry, I take it from the testimony that you have given that you have concerns about safety as well as concerns about fuel efficiency, and that you have seen this in a kind of a tradeoff circumstance; is that right?

Mr. Curry. I do not think it is a clear tradeoff, sir, because I think we can get both. I think we can improve safety. I think at the same time we can improve fuel economy.

Senator Bradley. Would you support reimposition of the 55-mile-an-hour speed limit as a way to get both?

Mr. Curry. I support that. Now, I cannot say the Secretary of Transportation will support that. I support that. I am the head of the agency for safety and as head of that agency I have to support anything that moves us in the direction of saving lives. I think that does, and the answer is I am already on record and I will go on record again as saying, yes, I support that.

Senator Bradley. How much would that save?

Mr. Curry. I do not have the figure. We could get it for you, sir.

Senator Bradley. Would you do that.

Mr. Canny. The National Academy of Sciences study that was performed before the speed limit was reduced from 65 to 55 on rural interstate highways estimated about 500 additional fatalities per year would result, and in the early years of the change that is approximately what the increase has been.

Senator Bradley. So it would ~~essentially~~ save 500 lives a year. Now let me ask you, you made the point earlier that a 1,000 pound weight increase, weight reduction, would lose how many lives a year?

Mr. Curry. That is not a forecast. That is past, that is based on past figures.

Senator Bradley. Yes.

Mr. Curry. We lose about 1,300 lives a year and we have about 6300 increased serious injuries a year.

Senator Bradley. So that if you decreased the weight by 1,000, you would lose 1,300 lives. If you then decreased the speed limit to 55, you would save 500, right? So what you would lose by decreasing the weight could be offset by nearly 40 percent by reducing the speed limit.

Mr. Curry. I think you can make that, mathematically make that tradeoff. I have to say, though, I think I am in favor of saving both groups, not just one.

Senator Bradley. No, I understand that.

Mr. Curry. I would not trade them off. I want to save them all.

Senator Bradley. Yes, we do not want any, I agree.

Dr. Plotkin, if I could. How much can we actually save in terms of natural gas in cars? How rapidly do you think you can change a fleet from oil to natural gas?

Mr. Plotkin. I think that it would take decades to move to a fleet which was primarily natural gas, several decades.

Senator Bradley. And why is that the case?

Mr. Plotkin. First of all, all the design features for acceptable performance are not commercial now. So there would be simply a period to get those vehicles, make sure they work properly, test them, and then just all the retooling that is necessary.

A natural gas vehicle is at least moderately different than a gasoline vehicle, though not extremely different. But just in terms of all the retooling, I would think it would be a couple of decades.

Senator Bradley. Are you aware of any existing retrofits?

Mr. Plotkin. Yes, there are retrofits, yes.

Senator Bradley. Do you have confidence in them technologically?

Mr. Plotkin. They work. There are performance degradations with them, but there are tens of thousands of natural gas retrofit vehicles in this country and they work okay. They have a range problem, however.

Senator Bradley. That means they have a supply problem for gas?

Mr. Plotkin. No, they have a problem in terms of just how far they can go on a fill-up.

Senator Bradley. That is what I mean, they have a supply problem. There is not a natural gas station on every corner.

Mr. Plotkin. Yes.

Senator Bradley. But from a technological standpoint, they are workable?

Mr. Plotkin. Yes, they are workable.

Senator Bradley. Does it make sense to you to try to encourage that movement from gasoline to natural gas?

Mr. Plotkin. That is a very difficult question. I think once we start, if we are talking about enough natural gas to displace a major portion of gasoline, then I think it is clear we would begin to have supply problems. We would probably have to start importing the gas, probably as LNG. First you could get some from Canada, a certain amount.

Senator Bradley. Or Mexico.

Mr. Plotkin. Or Mexico, if the Mexicans were willing. It is not clear that they would be.

Senator Bradley. If it was a free trade area.

Mr. Plotkin. Well, but they want to use a lot of this natural gas for their domestic industries.

But eventually you would have to turn to LNG. Then the question is, A, is this going to be really cheaper than gasoline and is it going to be of a national security benefit. Probably you would gain some benefit, at a very substantial cost, and the tradeoff is not really clear to me.

I think it is worth investigating, but I think it is very presumptuous of me or perhaps anyone to say yes, it is clear that is a good way to go.

Senator **Bradley**. This whole area is a tradeoff, as I understand the testimony, between safety concerns, between efficiency concerns, between environmental concerns, and cost concerns. Are those the four major areas that we have to consider as we think this thing through?

Mr. **Plotkin**. It sounds like it.

Senator **Bradley**. And it is presented frequently as difficult to have all of those and therefore you have to allocate costs among the various parties, is that right?

Mr. **Plotkin**. Actually, I should add, if you did not mention it, distributional concerns, because you may have no net cost, change in cost, for example, but you will affect industries dramatically. Some will do extremely well, some will do very poorly.

For example, all those refiners of gasoline might not appreciate your removing their markets from them.

Senator **Bradley**. Now, let me ask you, if we were able to get rid of the gas guzzlers, the old cars, how much would we save?

Mr. **Plotkin**. In the short term, I am sure we would do quite well with it. In the long term, it will not matter.

Senator **Bradley**. No, that is the question. My question is how much bump-up is out there, how much excess? The chairman has the idea that what we do is we take whatever the fees are, the fines, and use that to help retire gas guzzlers.

Now, the administration says they have a plan that they are going to announce shortly, and what I am just wondering is, let us assume that tomorrow we had no gas guzzlers; how much oil would we save?

Mr. **Plotkin**. The only way I can answer that question is referring earlier to Mr. Curry's testimony. He mentioned 10,000 to 15,000 barrels a day. That is a very modest amount of oil. I would hope that you could save more.

It depends on what you define as a "gas guzzler" and what it is replaced with as well. For example, if you define "gas guzzler" as a large, inefficient car, take it off the market, what replaces it? If it is replaced with the largest vehicles in the fleet, obviously the benefit is less than if it is replaced with Geo Metros.

The calculation can be done with a number of assumptions, but I cannot give you an answer off the cuff.

Senator **Bradley**. Mr. Curry, you did say that you are going to have an announcement soon on how you propose to get rid of the gas guzzlers?

Mr. **Curry**. I do not have the exact date of when it will be out, but the administration is working on that specific point, and the answer is we expect to have some legislative language on that, yes, sir.

Senator **Bradley**. What are the options?

Mr. **Curry**. I am not sure I understand the question. I think we should get the gas guzzlers off the market—I mean, out of the fleet. I think we should work with States to do that.

Senator **Bradley**. It is a little bit the same question that Senator Bumpers said about, you want to have fuel efficiency, well how?

And here you have said that you do want to get the gas guzzlers off, and I believe you said earlier that there might be an announcement in the next week. Therefore, obviously you are considering several alternatives.

Could you share with us what are the alternatives just from an analytical standpoint?

Mr. CURRY. That part I have not personally worked on, so I would have to supply that for the record for you.

Senator BRADLEY. Well, maybe your assistant does.

Mr. CANNY. Senator, the assumption in the National Energy Strategy work up to this point has been that that would be essentially a State or private initiative, as is already being done in California, that a private corporation, as you pointed out, has been offering a payment to take some of the older cars off the road.

Getting those old cars, which are both gas guzzlers and also serious polluters, can be an effective clean air strategy. And we expect that some metropolitan areas, some States, will want to use that as a relatively low cost way of reducing total emissions in some of the worst non-attainment areas.

Senator BRADLEY. What would be the Federal Government's role in that?

Mr. CANNY. Facilitating, technical assistance. We do not see a major Federal investment in that.

Senator BRADLEY. Like the transportation program.

Mr. CANNY. Not like the transportation.

Senator BRADLEY. Oh, sorry.

Mr. CANNY. We are talking about $105 billion in the transportation program for the next 5 years.

Senator BRADLEY. You said that from 1972 to 1982 we doubled fuel economy, but consumption went up, is that right, Mr. Curry?

Mr. CURRY. Yes. Yes, sir.

Senator BRADLEY. And consumption went up in your view why?

Mr. CURRY. The consumption went up. Why did it go up? There are a lot of reasons given, of course. Some would say that because, with fuel prices not having gone to the high forecasted levels, people could afford it, therefore they would drive more.

Certainly more cars were on the road since that period of time.

Senator BRADLEY. So price had a big impact?

Mr. CURRY. We think so.

Mr. CANNY. Population growth and economic growth were the main drivers.

Senator BRADLEY. Would you say that the most efficient way to reduce consumption is price?

Mr. CURRY. I think that is one way of reducing it. I have lived in Europe a lot of my life, where the price of gas, as you know, is three, four, five dollars a barrel—a gallon, rather. I have to tell you that today as we sit here the number of miles being driven in Europe is going up. The high performance cars, the numbers of them relative to low performance cars is going up. Gas guzzlers are going up.

So even though they have these very high prices, at the same time they are consuming more fuel than they have in the past.

Senator **Bradley**. I know, but the question is: Is this the best way to reduce consumption? Is price the best way to reduce consumption?

Mr. **Curry**. I think price is one of many ways to reduce it, and I think the National Energy Strategy looks at all of those sorts of approaches.

Senator **Bradley**. What does it do to raise prices?

Mr. **Curry**. I am not prepared to answer that. I have not worked on that, either, and I am not an expert in the area.

Do you want to comment?

Mr. **Canny**. Yes.

Senator **Bradley**. It seems to me the whole thing is premised on cheaper oil, not raising prices.

Mr. **Canny**. The expectation is that oil prices are going to grow, real prices are going to grow, at a moderate level over the coming years, and that is going to affect consumption to some extent. But the idea of imposing an energy tax, oil import fee, something of that sort, was looked at extensively in the National Energy Strategy development. The conclusion was that the impacts on the economy would overall be negative and the kind of distributional effects that Dr. Plotkin referred to would make that an undesirable policy.

Senator **Bradley**. I am going to give you one last chance. Dr. Plotkin, you can feel free to get into this. Is there a better mechanism than price to reduce consumption?

Mr. **Plotkin**. I am willing to get into it a little bit. First of all, I think that standards per se by their very nature are somewhat distorting. I think that if you want to have standards, all the arguments against the standards focus on the fact that the market is moving in a different direction, and I think it is important then to help the market move in the same direction as standards.

Mechanisms such as raising the price of gasoline, such as having gas sipper subsidies and gas guzzler taxes, all those things will help a standard be effective and will help the manufacturers sell the cars that they must manufacturer in order to meet a high standard.

I think personally that you do run a very substantial market risk if you have standards that are diametrically opposed to where the market is going. But that is not necessarily the argument not to have standards. It is the argument to do something else to help, first of all to send the right price signals.

Senator **Bradley**. What is the risk? You said you run the risk?

Mr. **Plotkin**. Well, the risk is clear, that the manufacturers build cars that are perhaps smaller and lower performance, in order to gain the higher fuel economy, than consumers want. And the theoretical risk is that the rate of turnover of the fleet slows down.

The most important single thing that is improving fuel economy in this country is turnover, that the old cars, which are less fuel efficient, die a natural death and new cars are bought. If you slow that process down, if you do heroic measures to keep those old cars on the road, if people buy fewer new cars, then you may actually have a counterproductive standard.

That is, if you set the standard too high you end up losing overall fuel economy. The idea is you try to set the standard in a place where you do not screw up the fleet so badly that people do not want those cars.

Senator **Bradley**. Can you give us any analysis, any backup, to this very reasonable statement?

Mr. **Plotkin**. I cannot tell you exactly how much, what the price of gasoline has got to be to change the market. I do not think anybody knows. I think if anybody tells you they know, I recommend that you ignore them.

[Laughter.]

Senator **Bradley**. Mr. Chairman, could I just flow one other thing out?

Is there any relationship in the following? This is just a thought. Finally, with utilities there is the view that if you save energy it is as good as building new power plants. Here we have old cars that have very high levels of inefficiency. Is there anything in it for the automobile companies to be able to have an option to help retire old cars, as opposed to meeting the new fuel efficiency standards?

Mr. **Plotkin**. One thing that is in it is that if you take enough of them off the road, just the demand for transportation is going to bump up against the new car market and there will be some effect, some positive effect, on new car sales. Not one to one, but there will be an effect.

Senator **Bradley**. So that the idea of some form of rebate idea, anything that would facilitate the retirement of old cars——

Mr. **Plotkin**. Yes, but I doubt if it would be cost effective for the companies themselves to bear the full burden. That is, if they spent $700 or $800 or $900 per old car to get them off the market, it is hard for me to believe that they would recoup that in the sales, in added sales, because you probably have to retire three, four, five, six old cars before you actually begin to see a new car sale, simply because, A, they are not driven as far and some of the increased mileage will probably end up with the newer used cars being driven more.

Senator **Bradley**. Thank you very much.

The **Chairman**. Senator Wirth.

STATEMENT OF HON. TIMOTHY E. WIRTH, U.S. SENATOR FROM COLORADO

Senator **Wirth**. Thank you, Mr. Chairman.

Senator Bradley, you had asked a question earlier about alternative fuel vehicles. My jeep in Colorado is alternative fuel. It runs on gasoline in the countryside and natural gas in the city. The natural gas costs about half as much as gasoline does, regular gasoline. You can get it in a lot of outlets in the metropolitan area, and I can go about 120 miles on the tank.

The problem, as Mr. Plotkin pointed out, is really the configuration of the tank, and that is now changing so that you can carry more compressed natural gas than you could before.

I was a little bit surprised. I think there is a lot of potential there. Fleets are beginning to move into this in a lot of metropolitan areas, and I think there is a great deal of potential for it.

You were talking about the constraints on this, Mr. Plotkin, for the availability of gas, which I found a little bit surprising, given what we are finding in terms of natural gas in the United States, particularly in the San Juan Basin and the Overthrust Belt, that whole area; second, what we know about the administration's proposal to allow the sale of Alaskan natural gas overseas, rather than building that pipeline down through Alaska to pick up on the Canadian pipeline system and have effectively sources of energy which could be very extensive for vehicles from natural gas, which is sources at least that are American in part. But even if they were Mexican and Canadian, you know, it would be significantly, I would think, more secure for us to be in that area rather than having this increased dependence on foreign oil.

It seems to me there is a logic to that that is inexorable, and I do not understand why we are not pursuing a lot more pressure on developing alternative fueled vehicles, which would be pressure for domestically or North American fueled vehicles. I would think that that makes us more secure, if that is one of the goals coming out of the Persian Gulf.

Mr. PLOTKIN. Senator, let me point out that you started the question by pointing out how cheap natural gas is.

Senator WIRTH. That is right.

Mr. PLOTKIN. One of the reasons it is cheap is because supply right now is slightly ahead of demand, so that there is a bit of a glut on the market. If we start pouring natural gas vehicles into the fleet, the first thing that will happen is we will put pressure on supply and price will go up.

If we take Alaskan gas and pipe it down to this country, it is going to be expensive gas, probably still cheaper than gasoline. But remember also, the vehicles themselves will cost more than gasoline vehicles. The net effect may not be a very heavy one economically.

Senator WIRTH. Well, I am not sure your economics are correct. I hear what you are saying, but if you look we have argued for a long, long time—and Chairman Johnston knows this—we have argued for a long time, where the arguments have been made that the price of gas is going to catch up. Well, the price of gas has not caught up at all for a long period of time. It has lagged way behind. Even now, even if it were the same price or a little bit less than gasoline, as you point out, the cost of having alternative fueled vehicles if you are producing them out of the manufacturer, rather than going through the cumbersome and expensive process of conversion, is probably not much greater than a regularly gasoline-powered vehicle, is it?

Mr. PLOTKIN. Not for natural gas.

Senator WIRTH. How much more do you believe it would be?

Mr. PLOTKIN. $700 or $800 a vehicle for a dedicated mass produced vehicle.

Senator WIRTH. $700 or $800?

Mr. PLOTKIN. Yes.

Senator WIRTH. Now, what analysis and study was done of that? Where is it?

Mr. PLOTKIN. I conducted a study.

Senator WIRTH. Can you provide that?

Mr. PLOTKIN. Yes.

Senator WIRTH. I would like to see that.

Mr. PLOTKIN. I would be happy to.

[The information referred to follows:]

CONGRESS OF THE UNITED STATES,
OFFICE OF TECHNOLOGY ASSESSMENT,
Washington, DC, March 6, 1991.

Hon. TIMOTHY WIRTH,
Committee on Energy and Natural Resources, United States Senate, Washington, DC.

DEAR SENATOR WIRTH: At the February 28th hearings before the Senate Energy and Natural Resources Committee, you asked me to provide you with further information about natural gas vehicles, and specifically about the cost of vehicles dedicated to that fuel. I have enclosed a copy of OTA's recent report on alternative fuels, *Replacing Gasoline: Alternative Fuels for Light-Duty Vehicles,*[1] which discusses natural gas vehicles as well as a range of vehicles fueled with other alternatives to gasoline.

In this report, OTA relied on estimates generated by other analysts. For natural gas vehicles, the reference for dedicated vehicles cited is a paper by Mark DeLuchi, R.A. Johnston, and Dan Sperling, all of the University of California at Davis. DeLuchi and Sperling are recognized experts on alternative fuels, and their cost estimates are generally corroborated by other available studies. As we note in the footnote on P.97, salvage and reuse of natural gas cylinders could allow significant cost savings, as could the potential to forego an NO_x reduction catalyst; if both occurred, a dedicated vehicle could cost in the range of only $300 to $400 more than a competitive gasoline-fueled vehicle. Neither cost saving is assured, however, and we have reservations about whether either is likely. Tough new NO_x emission standards will be difficult to achieve without a catalyst, and public wariness about the safety of natural gas pressurized storage could prevent reuse of the cylinders even if there is no scientific basis to deny such reuse. Consequently, we believe it is reasonable to assume that our original $700 to $800 cost increment for dedicated vehicles is still the "most likely" value, though it has a realistic downwards potential. Of course, as you pointed out in the hearing, a difference in cost is not the same as a difference in price, and automakers desiring to sell dedicated vehicles will price them to sell.

I hope this adequately addresses your concerns. If I may be of further assistance, please contact me at 228-6275.

Yours truly,

STEVE PLOTKIN,
Senior Associate.

Senator WIRTH. Because we had gotten during the Clean Air debate a great deal of discussion that this might be $200 or $300 more for a natural gas-fueled vehicle, and if you are talking $700 or $800—in any case, if the fuel is cheaper over a long-term period of time, that vehicle ends up paying for itself.

Mr. PLOTKIN. It does if the fuel is cheap enough.

Senator WIRTH. Yes.

Mr. PLOTKIN. Again, I point out that the price of natural gas now is extremely low because of demand. If you start pushing up against supply, price is going to go up.

Senator WIRTH. Well, supply has come on pretty significantly as well in recent times. Anyway, I think that the potential of this is a very significant one and one I would like to see your numbers related to the cost of natural gas vehicles.

Mr. Chairman, I was struck by the discussion earlier about the administration going for a National Academy study on fuel economy and what could be done. I think there are obvious questions to be asked as to what have you been doing every 2 years, where there is supposed to be a national energy policy, I understand, every 2 years in the administration.

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[1] The report has been retained in Committee files.

We have just had this 15-month period of time, Mr. Curry, in which the administration has been out there looking at National Energy Strategy, in which the number one recommendation made all across the country was one of conservation, and we are now going to have a National Academy study.

I would hope maybe we ought to also ask the General Accounting Office, Mr. Chairman, and get a study and take a look at what might be a possibility here. We are going to have all kinds of studies. I would hate for us to get into a situation of one study that comes back that becomes the hallmark or the one on which everything gets hung on, the National Academy study. I think we might want to give some consideration on that and I would like to talk to you afterwards about that.

The CHAIRMAN. We do have an OTA study under way.

Senator WIRTH. Great.

Can I ask you, are 40 miles per hour vehicles safe, Mr. Plotkin?

Senator WALLOP. 40 miles per hour or 40 miles per gallon?

Senator WIRTH. Are 40 miles per gallon vehicles safe?

Mr. PLOTKIN. They can be, yes.

Senator WIRTH. Are they safe?

Mr. PLOTKIN. Are they? I think there are safe 40 miles per gallon vehicles.

Senator WIRTH. Do you agree, Mr. Curry, there are safe 40 miles per gallon vehicles?

Mr. CURRY. There are some safe 40 miles per gallon, yes, sir.

Senator WIRTH. Assuming that these are safe, we have established the fact that in fact they can be made that are safe, put that issue off to the side. If they can be made safe, if we could create a market for 40 miles per hour cars—40 miles per gallon cars, could they be produced?

Mr. PLOTKIN. Yes.

Senator WIRTH. They could be produced as well. So if we could create a market for 40 miles per gallon cars, we would have safe cars and we could produce into that market?

Mr. PLOTKIN. Yes.

Senator WIRTH. What I am getting at is, are there then some ways in which we might be able to skin this a different way? Rather than looking at the CAFE standard or depending entirely on the CAFE standard, is there some other way in which we can develop a market for 40 miles per gallon automobiles?

Mr. PLOTKIN. EPA has recently done an analysis of the 1990 fleet, in which they asked the question: What would happen if there was a shift towards slightly smaller vehicles and also a difference in consumer preference so that consumers picked the more fuel efficient of the vehicles in each size class?

What they showed is at the extreme, just in the 1990 fleet, they could have achieved the 40 miles per gallon fleet. In 1995, with perhaps better technology, that number might be higher. But it means that you have got to have major changes in what the consumer wants in an automobile. But it is possible.

Senator WIRTH. What do we know about the gas guzzler-gas sipper, to come back to that, as an incentive? How effective? Do we know anything about how big that incentive has to be to encourage people to buy more fuel efficient automobiles and to penalize less fuel efficient automobiles?

Mr. Duleep. If I may take that question, sir. We have done some work in this area and what we have found is that in general people are—the elasticity of choice, if you will, is fairly high within the size class. That is, if you are considering different models, all of which are about the same, and one is more fuel efficient than the other, then the money that you need to shift people from one car to another is not large, which is why you often see these $500 rebate schemes.

But if the consumer wants to buy a big car and you want to move him into a smaller car, then that elasticity tends to be quite high. The subsidy has to be a couple of thousand dollars before they would consider getting something that they do not want.

So there is these two different kinds of elasticity. One is within class and one is across classes.

Senator Wirth. Well, obviously we would not have had a rebate system in terms of marketing in this country if that had not been effective.

Mr. Duleep. That is right.

Senator Wirth. They must have found that to be effective.

Mr. Duleep. That is right.

Senator Wirth. Therefore, how big a rebate or how big a gas guzzler-gas sipper incentive, which I suppose is a different kind of a rebate, would you have to set up to help to market 40 miles per gallon automobiles? I think there is a significant case that could be made on behalf of the automobile manufacturers saying you can require all you want, but if nobody wants to buy them we are stuck. That is a pretty legitimate case to be made.

So how do we look at it another way and try to understand what that market might be, and how do you get people to purchase cars in that market?

Mr. Duleep. First, right now the only 40 miles per gallon cars that are available are all in the subcompact class. So within the subcompact class, the subcompact cars constitutes about less than a quarter of the total sales of automobiles in the USA.

So within that class, you can obviously move people from, say, 35 miles per gallon cars to 40 miles per gallon cars.

Senator Wirth. Could you set up a market mechanism on alternative fueled vehicles versus regularly fueled vehicles, that if you purchased an alternative fueled vehicle that was a natural gas vehicle that you could get a rebate for that versus the other?

This might in part get over Mr. Plotkin's suggestion that it is more expensive, that you have got a problem there. For national security reasons and for domestic fuel reasons and so on, could you set up a system like that and get over the problem you are talking about, Mr. Plotkin?

Mr. Duleep. Yes, certainly I think a rebate of $300, $400, $500, people do notice, and that is why you see them advertised, and that is a very powerful reason for thinking that it does work. So yes, we think that the rebate could work if the price incentive was in that range.

Senator Wirth. A final question if I might, Mr. Chairman.

There has been discussion about, or the administration has been suggesting, various kinds of credits for dual-fueled vehicles, is that not right? That if a manufacturer manufactures so many dual-fueled vehicles, they get a credit against the miles per gallon standard, is that not correct?

Mr. PLOTKIN. Yes.

Senator WIRTH. Now, what happens if that dual-fueled vehicle is dual-fueled, but runs entirely on gasoline?

Mr. PLOTKIN. Then you have given away the store.

Senator WIRTH. So then you have given away. Then you do not really get anything out of the credit?

Mr. PLOTKIN. Nothing.

Senator WIRTH. So therefore any credit ought to be for alternative fueled vehicles only, is that the conclusion that comes out, if you are going to create a credit, only if you have a solar car or a natural gas car? Is that the conclusion?

Mr. PLOTKIN. Well, not necessarily. I think that it depends on whether you are willing to guarantee supply at a competitive price. I mean, there are ways. For example, I think some of the alternative fuel proposals demanded that fuel be available, that it be priced competitively, that a certain amount was sold.

So you can have dual-fuel vehicles and pretty well guarantee that they are going to use the methanol or natural gas or whatever that they are designed to use. But if you take no action in that regard, if you simply demand that the vehicles be sold and do nothing about supply, then you run the risk of, as you say, giving away the store and getting nothing in return.

Senator WIRTH. That would seem to argue then for standards as well related to fleets and metropolitan areas, where you would concentrate enough of the demand for the fuel, if you anticipate that long enough in advance, that then the supply, the infrastructure for supplying, say, natural gas to vehicles would presumably follow along, would it?

Mr. PLOTKIN. I think clearly fleets are the first place you would go for alternative fueled vehicles.

Senator WIRTH. And have studies been done on that, no how much gasoline, how much oil would be saved if we went to an aggressive fleet standard?

Mr. PLOTKIN. Most of the studies do not really answer that question. They simply postulate a scenario: If we sell X number of vehicles, you get Y savings. I am not really sure that any of the studies are really prepared to say, if we do the following that is not just a requirement, then we know the response will be X thousand vehicles. They do not really.

I think it is too soon to really tell, if you have a certain rebate or a certain kind of economic incentive, precisely how many vehicles you are likely to sell. So that the available studies really do not help you very much.

Senator WIRTH. Mr. Chairman, I think there is a lot of virtue in pursuing CAFE standards, but I think we also have an interest in looking at alternative fueled vehicles more aggressively here, I think, and looking at potential rebates for alternative fueled vehicles and developing that kind of a market mechanism, looking at fleet standards and cities.

I would think that in that area, if we are interested in trying to back out petroleum long term and move toward alternative fueled vehicles and try to use market incentives, we might have some very real opportunities to do that in this bill. And I know that you have been interested in that as well and perhaps we can explore that.

The CHAIRMAN. We have a hearing set on March the 20th on fleets, and I would hope that we can add it to our bill when we get the administration's proposal and as we develop it through the 20th. I would personally like to add that or add a version of it to this bill.

Senator WIRTH. Mr. Curry, do your comments on safety, when you talk about safety, do they assume that all the cars you are talking about are going to have air bags?

Mr. CURRY. The historical data that we have used to develop the studies that have been peer reviewed are not based on the assumption that all cars will have air bags.

Senator WIRTH. If you make the assumption that all cars have air bags and you are concerned about safety, how does that change the mortality numbers that you were describing earlier?

Mr. CURRY. Well, we discussed that a bit. There are savings and tradeoffs and there are losses.

Senator WIRTH. That is not an answer. If you assume that all, if you were to require every automobile to have an air bag on both sides, what would that do to your figure of 1300 deaths for lighter vehicles?

Mr. CURRY. There would be very little change, because we do assume in our studies that those cars have seat belts, manual seat belts, and manual seat belts are within about 15 percent of being as effective as air bags. In fact, you need them both together, air bags and seat belts, to really be positively safe.

So it is not going to have a significant effect on that figure or that study one way or the other.

Senator WIRTH. Do you know anything about that, Mr. Duleep?

Mr. DULEEP. The whole issue, I think it is, as Mr. Curry says, it is a very complicated issue. Weight alone is just not an indicator. The size, all of these issues come in, and I think that you cannot answer it with a yes or no or a number like this. It is just too complicated to do that.

Senator WIRTH. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Wirth.

Gentlemen, you have been an excellent panel. We appreciate it very much. We will probably be talking to you some more as this unfolds.

Senator WALLOP. Mr. Chairman, could I ask?

Mr. Plotkin, you said that you were going to supply some estimates, I think it was to a question of the chairman during Senator Murkowski's questions. You mentioned various estimates of the fuel savings, the DOE's 500,000 and Bryan's 2.8, and you were going to supply an evaluation of those estimates.

Mr. PLOTKIN. Yes.

Senator WALLOP. Could you at the same time—is it possible for you to supply a per barrel saved cost, dollars per barrel saved?

Mr. PLOTKIN. I cannot do it.

Senator **Wallop**. You cannot do it?

Mr. **Plotkin**. I simply—it is possible to do it, but can I sort of leave that up in the air for now?

The **Chairman**. Thank you very much indeed, gentlemen.

Mr. **Curry**. Thank you, Mr. Chairman.

The **Chairman**. I must apologize to the next panel, but Mr. Owen Bieber must catch an airplane at 12:50. Mr. Bieber, we especially apologize to you. But I want to get him on as a single witness so he can testify and catch his plane.

So Mr. Bieber, would you come forward, please. We are very pleased and honored that the UAW would send its President.

STATEMENT OF OWEN BIEBER, PRESIDENT, UNITED AUTO WORKERS, ACCOMPANIED BY RICHARD WARDEN, LEGISLATIVE DIRECTOR

Mr. **Bieber**. Thank you very much, Mr. Chairman.

I am the President of the United Auto Workers. I am accompanied this morning by Dick Warden, the UAW's Legislative Director.

We appreciate this opportunity to share with you our views on title XI of S. 341 and on some of the issues the legislation raises. I will summarize our prepared statement and ask that it be included as part of your hearing record.

The **Chairman**. It will be.

Mr. **Bieber**. The UAW has supported the use of fuel economy standards to help achieve the goals of energy conservation and reduced dependence on imported oil. We supported the fleet-wide Corporate Average Fuel Economy approach adopted in 1975 and the creation of separate domestic and import fleets to encourage domestic small car production. In our judgment, the enactment of that legislation represented wise public policy and the CAFE standards have helped to make the automobiles on our Nation's highways today much more fuel efficient.

The UAW continues to support the CAFE statute. The fuel economy standards adopted in 1975, however, have not solved all of the problems to which they were addressed. Although domestic manufacturers have produced enough small cars to comply with the domestic fleet standard, they have continued to import small cars. U.S. employment in the small car production is not at the level that we had anticipated or expected.

The purpose of the separate fleet averaging was turned on its head when Ford Motor Company purchased abroad enough of the value in its large cars to include them in its foreign fleet. Full-line producers have argued that they could not meet the recent demand for high performance cars as readily as those manufacturers that historically focused on the small car segment without risking a penalty under the CAFE rules.

We would support a revised fuel economy law that would assure improvements in fuel efficiency by all companies, not create incentives to source large cars abroad, provide incentives to build small cars in the United States, and not put full-line producers in a position to argue that the law places them at a competitive disadvantage in a changing market.

We agree with the provisions of title XI of S. 341 that would require all manufacturers to achieve the same percentage increase from their fleetwide fuel economy average. The length of the lead time from design to implementation in the auto industry means that more significant gains in fuel economy can be achieved by the year 2002 than by 1996.

Mr. Chairman, we believe that the economic practicability of the standards must include their potential impact on employment in the auto industry and the supplier industries and the impact on the financial condition of the producers. Since title XI relies on consumers buying new vehicles to raise economy, only cost-effective technologies should be considered in developing the standards.

With respect to establishing future CAFE standards, the UAW does not necessarily agree that the Secretary of the Department of Transportation would be better qualified than the Congress to determine the fuel economy targets.

We are concerned that allowing the trading of fuel economy credits could result in domestic full-line producers ending their U.S. production of small cars, with potentially serious consequences for domestic output and employment. Adoption of a domestic small car fuel economy credit would encourage domestic production and could lead producers to shift their mix of products toward small cars and raise their overall fuel economy.

The UAW would support scrappage programs designed to promote the removal of old polluting, low fuel economy vehicles from the roads. But the use of penalties paid for failure to meet fuel economy standards may not be an adequate source of funds for such programs.

Mr. Chairman, I would point out "USA Today" carried some very interesting figures. It shows that there is a record million cars out there on the road that are older than 10 years and there is a record 30 million cars that are 5 and 6 years old.

Mr. Chairman, we are grateful to you for giving us this opportunity to comment on title XI of your bill. We look forward to working with you in the development of your comprehensive energy legislation and, again, thank you for the opportunity of appearing here.

[The prepared statement of Mr. Bieber follows:]

PREPARED STATEMENT OF OWEN BIEBER, PRESIDENT, INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE AND AGRICULTURAL IMPLEMENT WORKERS OF AMERICA

Mr. Chairman, my name is Owen Bieber. I am President of the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW). Our union represents 1.4 million active and retired workers. I appreciate this opportunity to present the views of the UAW on Title XI of S. 341, which concerns standards for Corporate Average Fuel Economy (CAFE). We recognize and applaud your interest in improving the fuel economy of vehicles sold and operated in the U.S. without sacrificing other important objectives, such as high levels of employment, safety and environmental standards, the financial viability of automotive producers and the affordability of vehicles for consumers.

The UAW has supported the use of fuel economy standards to achieve the goals of energy conservation and reduced dependence on imported oil. The conflict in the Persian Gulf has reminded anyone who may have forgotten that reliance on imported oil is dangerous for the nation. The importance of energy conservation is undeniable.

When fuel economy legislation was first considered in the mid-197Os, the UAW supported the fleetwide average approach that was adopted in the 1975 law. This guaranteed that progress in fuel economy would be made, but allowed the manufacturers sufficient flexibility to meet the standards efficiently and without dislocation.

Further, the UAW supported the requirement that manufacturers meet the fuel economy standards separately for their domestic and imported fleets. We were concerned then that the domestic manufacturers would try to meet the fuel economy standards by importing small cars rather than producing them here. To meet the standards for their domestic fleets, the manufacturers would have to build small, fuel efficient cars in the U.S. to offset the lower fuel economy of their larger vehicles.

At the same time, we recognized that fuel economy standards alone were not an adequate solution to the need for conservation. We advocated the establishment of a federal agency to coordinate research on fuel economy and emissions technology and called for a comprehensive transportation policy to promote other approaches to fuel conservation. To ensure that workers adversely affected by fuel-economy related actions did not suffer unduly from these policies, we also supported assistance for any dislocated workers. Unfortunately, these proposals were not included in the law enacted in 1975.

While helpful, the fuel economy standards adopted in 1975 have not solved all of the problems to which they were addressed. The U.S. remains too dependent on imported oil, and our environmental problems continue. In addition, the standards have not worked exactly as anticipated. While the domestic manufacturers have produced enough small cars to comply with the separate domestic fleet fuel economy standard, they have continued to import small cars. General Motors and Ford each import vehicles from South Korea; GM and Chrysler import small cars from Japan, and Ford builds small cars in Mexico for sale in the U.S. and Canada. Employment in small car production in the U.S., therefore, is not at the level we expected.

Ford has turned the purpose of the separate fleet averaging on its head by purchasing enough of the value in its large Crown Victoria and Grand Marquis cars abroad to include them in its foreign fleet, even though they are assembled in North America. Because it also imports high fuel economy models, Ford's foreign fleet can still meet the 27.5 miles per gallon standard with these large cars included. The foreign-sourcing of the parts for the two models affected has cost the jobs of American workers and has not raised Ford's overall fuel economy one iota. These results cannot be considered a public policy success.

There has been another inequity that has arisen under the 1975 fuel economy standards. Vehicle manufacturers that produced a full-line of products have argued that they have a more difficult time meeting the standards than companies that have specialized in the production and sale of small cars. In the past few years, as the inflation-adjusted price of gasoline fell and the wealthy benefited from tax changes and uneven economic growth, demand for high performance vehicles increased. Companies which were already having difficulty achieving the fuel economy standards because of the number of large cars in their mix of sales could not meet the demand for high performance cars without risking a penalty under the CAFE rules as readily as those manufacturers that exceeded the standards due to their historical focus on the small car segment of the U.S. market. The fleetwide fuel economy for the latter group of producers has been falling, and the full-line producers have failed to meet the 27.5 mpg standard. Again, the goal of improved fuel economy was not served by the move to higher performance vehicles and the full-line producers claim that the CAFE standards have diminished their ability to compete.

The UAW would like to see a revised fuel economy law which guarantees real improvements in fuel efficiency by all companies, which does not create incentives to source large cars abroad, which provides incentives to build small cars in the U.S. and does not put full-line producers in a position to argue that the law places them at a competitive disadvantage in a changing market.

TITLE XI OF S. 341

The bill that you have introduced, Mr. Chairman, would require numerous changes in the way fuel economy standards are set and revised. Some of these changes have been raised and discussed in the past and we have well-established positions on them. Other proposed changes that we have not addressed in the past have stimulated new thinking and we are pleased to share our views with you.

First, let me note some of the features of Title XI that the UAW endorses. We agree that all manufacturers should be required to achieve the same percentage increase from the level of their fleetwide fuel economy average in the base year (model year 1990). This approach ensures that all companies improve the fuel economy of their vehicles and that they all must improve by an equal proportion. Any company, not just the full-line producers, would risk failing to meet the standards by pushing sales of high performance vehicles.

The continuation of the use of a fleetwide average for calculating compliance with the standard maintains needed flexibility for the manufacturers in introducing fuel-saving technologies for a limited range of vehicles at any one time. It is not always possible to raise the fuel efficiency of all models simultaneously.

Second, the list of factors cited in Title XI to be considered in setting maximum feasible fuel economy standard is comprehensive and realistic. Holding performance characteristics and size mix of each manufacturer's fleet constant at the base year level means that the new standards need not be met simply by cutting back on the size or performance of the vehicles produced. It also means that shifting to higher performance or larger, heavier cars requires compensating gains in fuel economy due to technological innovations or improvements elsewhere in a company's fleet.

Federal mandates in the areas of safety and emissions must be given full weight in the setting of fuel economy standards, as they are in this legislation. These areas of public policy are no less important than fuel conservation; advances must be made together, recognizing the impact of each on the others. Given the uncertainty regarding the implementation of the Tier II emissions standards included in the 1990 Amendments to the Clean Air Act, a thorough examination of the impact of those standards on fuel economy should be undertaken. The size of the impact will help determine whether they should be directly considered in setting the fuel economy level for 2002.

The implementation of fuel-saving technologies is recognized in Title XI as an important element in achieving the maximum feasible fuel economy. Title XI also recognizes that the rate of market penetration of different technologies varies and that there may be "technical, financial, regulatory, organizational, and marketing limitations to deploying" these technologies. It is important to understand that the existence of new technologies does not mean that their potential to raise fuel economy will be realized. The standards cannot, therefore, assume full implementation of all technologies capable of being commercialized without qualification.

The lead time needed to design, engineer, test and build new models in the automotive industry is often underestimated. Title XI acknowledges that the lead time must be taken into consideration when setting standards for 1996 and 2002. It is our view that much more significant gains in fuel economy can be achieved by 2002 than by 1996. Much of the planning for the 1996 models has already begun; changes in basic technologies or components would be difficult to make.

Prior to spelling out the specific factors to be considered in determining the maximum feasible standards, general considerations are listed. One of these, economic practicability, deserves further elaboration. The potential impact of fuel economy standards on industry employment deserves great consideration. The nation would be poorly served if fuel economy gains were achieved at the cost of the loss of thousands of high productivity, high wage jobs that cannot be replaced. Further, if domestic auto production were cut back substantially, important markets for domestic producers of a variety of high-technology manufactured goods would also be lost. Workers in those industries would be adversely affected as well. The process for setting fuel economy standards must include an assessment of the impact of various standards on employment.

As the U.S. recession deepens and the domestic auto producers report sizable losses for recent months, it becomes clear that the ability of corporations to undertake the necessary investments to raise fuel economy must also be taken into account in the standard-setting process. The American public would not derive long term benefits from the adoption of standards that resulted in the financial decline of the auto producers.

Finally, economic practicability must include consideration of the cost effectiveness of the various means available to raise fuel economy. By mandating higher fuel economy standards for new vehicles, Title XI would rely on consumers buying these vehicles to achieve the fuel conservation desired. If the cost of the vehicles is beyond the means of consumers, or puts new cars at a disadvantage relative to used cars, little will have been accomplished. The standards cannot assume the implementation of technologies that have excessive pay-back periods.

The heart of the fuel economy provisions in S. 341 revolve around the process for determining the maximum feasible average fuel economy and who makes that determination. I have described our general agreement with the factors set out in the bill that must be considered and our support for requiring all producers to achieve a single percentage increase from their base year average fuel economy.

The UAW does not necessarily agree, however, that the Secretary of the Department of Transportation is better qualified than the Congress to accurately determine the maximum feasible fuel economy target. The goals set by the Congress in 1975 proved to be challenging for many producers, but they were feasible and they were, for the most part, met. Through extensive hearings and discussions with all the parties with an interest in automotive fuel economy, Congress can be effective in building a consensus around specific targets or, at least, in using the research available and the testimony of interested parties to produce defensible goals. By requiring that standards for model years 1996 and 2002 be set before July 1, 1992, S. 341 would assure that the Bush Administration would make these determinations. We are not convinced of the wisdom of that provision.

The UAW believes the authority given to the National Highway Traffic Safety Administration (NHTSA) under the EPCA to modify the fuel economy standard for a particular year due to unusual circumstances should be retained.

Another proposal included in S. 341 would allow companies to trade credits earned by exceeding the fuel economy standards between classes of vehicles and between firms. We cannot be certain how this trading would work, as there has been no similar experience to demonstrate its effect. We could anticipate circumstances, though, in which domestic full-line producers would end their U.S. production of small cars, fail to reach the fuel economy standards for their domestic fleet and purchase credits from their own foreign fleet or from other producers to achieve compliance. If that were to happen, the U.S. industry would lose much of its small car production capability, with potentially serious consequences for domestic output and employment.

We cannot support the effective elimination of the requirement that each firm comply with the standards separately for its domestic and foreign sales. While the ability of a company to trade credits could remove the incentive under the current law to source large cars abroad, it would undermine the incentive to produce small cars domestically. The UAW is strongly committed to the U.S. remaining capable of producing all types and sizes of vehicles for this market. Small cars are an important part of the market. If the trend toward fuel conservation and self-reliance continues, small cars may be the vehicle of choice for many consumers. We do not believe that it is in the interest of the U.S. economy or the auto industry that these consumers be forced to purchase foreign vehicles.

The UAW has proposed that domestic small cars qualify for an extra fuel economy credit to encourage domestic production. This would be similar to the credit for flexible fuel vehicles included in the Alternative Motor Fuels Act passed in 1988. In addition to providing an incentive for domestic small car production, the credit could lead producers to shift their mix of products toward small cars and, thereby, raise their overall fuel economy.

Requiring the same percentage increase in domestic and import fleets for each manufacturer and adopting a domestic small car fuel economy credit together would promote the UAW's objectives (stated above) in the revision of the fuel economy standards. Allowing the trading of credits for exceeding the standards for any one fleet would undermine those objectives.

Mr. Chairman, there are many other sections of Title XI of S. 341 which I have not addressed. I am not an expert on the technology of fuel economy, emissions or safety and the UAW does not have staff with such expertise. I will briefly touch on some of the other issues raised in the legislation you have introduced, with the understanding that our views on them are not fully formed.

The UAW is interested in exploring the possibilities of alternative fuels and is willing to consider incentives to use them. We support programs aimed at scrapping old cars, which emit far higher levels of pollutants in addition to using more fuel. But the federal funding described in S. 341 would come from penalties paid for failure to meet fuel economy standards. This may not be adequate as a source of funds. In our view, the $5 penalty has been a meaningful deterrent to falling below the fuel economy requirements; a significant increase in the penalty to $20, as proposed in S. 341, may not be necessary. Even if the higher penalty were adopted, it would be unlikely to generate much money for the scrappage program.

Mr. Chairman, your legislation and this hearing present an ambitious set of issues and questions. I have attempted to address them as fully as possible at this time. We look forward to continuing discussions with you concerning the best ways to raise U.S. fuel economy. Thank you giving me this opportunity to present the views of the UAW on these issues.

The **Chairman**. Thank you, Mr. Bieber. We appreciate very much your being here. Thanks for bringing Dick Warden. We have high regard for him around Washington.

Let me, if you have got time for one question, and you can reply in writing if you would like to do so more fully. But there has been a suggestion that we ought to have what is called VAFE, that is to require each automobile by weight, or actually by interior volume, to make a similar kind of increase in miles per gallon, as opposed to CAFE. Do you have a view that you would like to express at this time or would you like to——

Mr. **Bieber**. I think I would like to submit that in writing to you, sir.

The **Chairman**. Very well.

[The information requested was not received at the time the hearing went to press.]

The **Chairman**. We may or may not try to develop a VAFE response to this. Mr. Plotkin has been proposing that, as others have, through the years. But if we do, we will submit that to you and ask for your response.

Senator Wallop.

Senator **Wallop**. Mr. Chairman, I understand the need to catch the airplane, and I would submit my questions for the record, too.

I find myself in very much general agreement with the statement of the United Automobile Workers. One of the areas where I think we are going to have trouble is the domestic small car benefit, just because of GATT and other kinds of things, which tends to lead me in the direction of what Senator Johnston was talking about and the very kind of thing that we propose in our bill. But I would be happy to work with the UAW on that.

I think retention and maintenance of a strong domestic automobile industry is every bit as much important to the United States as is the CAFE standard.

Thank you.

Senator **Wirth**. Mr. Chairman.

The **Chairman**. Thank you.

Senator Wirth.

Senator **Wirth**. Let me just make a brief comment. Mr. Bieber, to your left is Mr. Warden, who has announced that he is going to be leaving the groves of the Congress, which is going to be a great loss for many of us. I just want to tell you how very well represented you have been up here on the Hill for so many years and what contribution Dick Warden has made, not only to this institution but to the old Department of Health, Education and Welfare when he was down there. And I thank you very much for your good judgment in having Dick Warden around.

Mr. **Bieber**. I appreciate those statements very much, Senator. And of course, we would have preferred that Dick not decide to leave at this time. But, having made that decision, we appreciate the years that he has given us, and we are also, I think, blessed with the fact that a young man by the name of Allen Reuther, who has had the opportunity to apprentice under Dick for some time now, will be moving into his position.

Senator **Wirth**. Finally, Mr. Bieber, if you all have done any work on the alternative fueled vehicles, on the incentives for bringing them in on fleets and what that does, I would really appreciate, maybe you could ask Mr. Warden to drop that by our office and let us know your thinking on that subject

Mr. **Bieber**. Senator, that is one of the points that I do just want to take 1 minute to make, and that is that unfortunately we do not have the type of expertise to be able to put together a broad study of our own.

I might tell you that I attempted some time ago to see if we could go to the outside market to come up with some of those figures. You heard from the previous panel—and that is not being in any fashion derogatory of them, but you have heard from them a wide range of different views. So it is very difficult.

I believe that the auto company people who will be testifying certainly will share with you whatever information they have. I am hopeful that the DOT study might give us some direction.

I would just make this final statement. I could not help but think as I watched what happened in the Persian Gulf, I am extremely proud of the fact that a lot of the members I represent helped build some of those very sophisticated pieces of weaponry, and I am delighted that it shows that American quality is at the very top of the heap, and I hope that everyone recognizes that, not only in armaments but in other products as well.

I really mean this when I say I think it is a tragedy that perhaps we have not been able to put together, with the Federal Government's involvement, a team really to study these sort of things, to tell us what kind of technology there should be available or there might be available. After all, if we look at the weapons systems, obviously we did that there. There was investment on the part of the total country.

I would commend the auto companies for their joint approach now on studying how we can develop a battery for an electric car. Maybe this is something you ought to take a look at, because I really believe it is a national issue and one we all ought to participate in.

I do not think that anyone is arguing that we should not try to reach the maximum efficiency that we can. All I am pleading is do not enact legislation that in fact costs us a multitude of jobs and really does not get to the bottom of our problem anyhow.

I do not think there is anyone who will disagree if we can increase efficiency of automobiles. The manufacturers will not disagree with that because it is a means of a more competitive product out there.

But some of these figures that I see tacked to the wall, I do not have to be an Einstein to know that you just cannot reach it and get there. Once you have taken 1,000 pounds out of that car, you cannot take that same 1,000 pounds out again.

I thank you, Mr. Chairman, for the opportunity. I appreciate your recognizing my problem on schedule.

The **Chairman**. Thank you very much, Mr. Bieber.

Next we have a panel, and I apologize in advance to the panel, which is composed of: Mr. Philip M. Smith, Executive Officer of the National Academy of Sciences; Mr. Daniel A. Lashof, a senior scientist of NRDC; Mr. Ronald R. Boltz, Vice President, Product Strategy and Regulatory Affairs of Chrysler; Mr. Peter J. Pestillo, Vice President for Corporate Relations and Diversified Businesses of the Ford Motor Company; Ms. Marina Whitman, Vice President and Group Executive for Public Affairs of General Motors Corporation; and Mr. John E. Reilly, Chairman of the Association of International Automobile Manufacturers, Incorporated, here in Arlington, Virginia, who is also Chairman of American Isuzu Motors.

We have six witnesses and 45 minutes. So why do we not, if the witnesses would try to sum up in 5 minutes, that will allow a short period for questions.

So let us begin with Mr. Smith.

STATEMENT OF PHILIP M. SMITH, EXECUTIVE OFFICER, NATIONAL ACADEMY OF SCIENCES

Mr. SMITH. Mr. Chairman, I will help you pick up time, because my appearance here today is for the purpose of describing our study at the National Research Council and National Academy of Sciences that is just beginning. So I am unable to give you any definitive comments about our thinking.

In your introduction of S. 341 and in your opening comments this morning, you stated the issue. We can, the Congress, the administration, and public can, pick a number that sounds tough and then just try to implement it, or there can be an informed debate to try to come to the best possible informed decision about how to achieve higher automotive fuel efficiency.

We hope through the study that has been commissioned by the Department of Transportation that we can make a contribution to this discussion. Essentially, in the study we are going to address the kinds of issues that have been under discussion for the last hour and a half or so here this morning: the current and probable technologies, state of the art worldwide, that can be introduced in the next decade.

Particularly, there are important issues of what can be done in terms of incremental technological change. There are the issues that Mr. Curry referred to of achieving higher fuel efficiency and maintaining and improving safety. There is the viability of the domestic automotive industry in the U.S. market and in the worldwide market. And then there are these various barriers of one kind or another that constrain the introduction of new technology or higher fuel efficiency.

We will look at all of these issues in our study. There will be two phases to the study. The first phase, with a very ambitious time schedule since we just received the request from the Department of Transportation at the end of December, is for us in the first phase by the end of June to lay out our first estimates about the technological possibilities.

Later, in a second phase which goes to March, the end of March 1992, we will examine these issues in more depth, including some of the alternatives.

Now, I realize that is a timetable that is not a timetable that some will like because it is too extended, but that is nonetheless the timetable under which we feel we can work and provide for the Congress and the administration some technical and scientific informed judgment.

We will not in the end recommend specific CAFE standard figures. We will inform the discussion about what the numbers ought to be, but we believe that the elected and the public officials must in the end lead the discussion and determine what specifically will be in the end enacted.

Our committee that we are putting together—and we will provide you the list of the committee members when we have the committee assembled—will have all of the relevant expertise: technology, fuel capability, manufacturing issues, environment, safety, the issues of market, labor, and so on.

As you know, we have a distinctive way of working in our institution and it is the hallmark that kinds of sets us apart from the others who provide technical and scientific advice.

The National Research Council, the operating arm of the Academy of Sciences and the Academy of Engineering, essentially operates with seven or eight cardinal points that we call the NRC process.

First off, though we are chartered by the Congress to advise Government, we are an independent organization, and thus we are independent from the agencies of the Government and from organizations.

Ours is an organization in which there is voluntary public service. Our panel members are not compensated for their services and the Academy receives no fee. Thus, we are somewhat different from other consultive organizations and others who provide technical and scientific advice.

We organize balanced committees. Extreme and fixed points of view or points of view by people who have technically made their minds up are not the kinds of people we seek for our panels. Because we seek people who will help do analysis. We back them up with an expert staff.

We have a process inside our organization for the examination—rigorous examination—for potential sources of bias and conflicts of interest. We try to achieve consensus reports with recommendations, rather than just present various points of scientific view.

Finally, we have a review process that means that all of our reports, before they are issued, are reviewed by an independent group of reviewers. This is supervised by a committee that is entirely made up by members of the academy, the Academy of Engineering, and the Institute of Medicine.

We know the interest that your committee has, the other committees of the Congress, the departments and agencies, and indeed, the public and the private sector in our work. We will try to work in a way that has a broad input from all of these sectors. And we look forward to giving you testimony at some future point in time on our results.

Thank you.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF PHILIP M. SMITH, EXECUTIVE OFFICER, NATIONAL RESEARCH COUNCIL

Mr. Chairman and members of the Committee. My appearance today is for the purpose of describing the evaluation that will be undertaken by the National Research Council (NRC) of the prospects for improving the fuel economy of new automobiles and light trucks in the United States. The Research Council as you know is the operating arm of the National Academies of Sciences and Engineering. I am the Executive Officer of the NRC and with the NRC Chairman Frank Press am responsible for the overall management of our institution. I will comment briefly on the study and also on our process—the NRC process as we call it—for it is the process of our work that gives credibility to National Research Council conclusions and recommendations. I will not offer any views on fuel economy or strategies for achieving increased efficiency as it would be inappropriate at the outset of the study.

THE STUDY OBJECTIVES

The study was initiated by the Department of Transportation's National Highway Traffic Safety Administration. The fundamental purpose of the study is to estimate fuel economy levels that can be practically achieved in the next decade in new vehicles while meeting existing and pending environmental and safety standards.

Initiated at the end of December, 1990, the study is to be conducted in two phases. The work under Phase 1 is scheduled to be completed by June 30, 1991 and that under Phase 2 by March 31, 1992. Phase 1 of the study will provide, on a "best judgment" basis, estimates of fuel economy that can be achieved by size class of vehicles (e.g., full-sized, mid-sized, compact, and sub-compact passenger cars, and large and small light trucks).

The study will, among other things, take into consideration provisions of the Clean Air Act Amendments of 1990; the state-of-the-art, worldwide, in the applications of technologies relevant to achieving higher fuel economy and improving safety; and the viability of the domestic automotive industry in the U.S. market.

In addition, principal barriers that may constrain the rates at which technologies enhancing fuel economy can be introduced and sustained in the marketplace will be identified.

Specifically in Phase 1, the committee will address the following:

> It will evaluate technologies in conventionally powered cars and light trucks that could, in the time frame of the next decade, contribute to improved fuel economy of new vehicles.
>
> It will identify and describe the principal barriers to the introduction in the United States of the technologies underlying the improvements in the fuel economy of new vehicles.
>
> It will prepare estimates by vehicle size class of the fuel economy gains that can be practically achieved in the United States in the next decade.
>
> The Committee will also prepare estimates, by vehicle size class, of costs and benefits to the consumer attributable to higher fuel economy, and the incremental annual cost, in aggregate, to the automotive industry in producing such vehicles.

The Committee will not, however, address the formulation of new corporate average fuel economy (CAFE) standards. Nor will it, in Phase 1, address other public policy measures to achieve greater fuel economy in new vehicles.

A Phase 1 report setting forth the committee's findings is to be completed by June 30, 1991. The proceedings of a workshop to be held during the first Phase will also be produced as part of the Phase 1 documentation. This schedule is extremely ambitious for a study that depends on the volunteered time of experts. We are endeavoring to ascertain that those who do agree to serve have sufficient time to devote to this important project but understandably people of the caliber we are seeking will already have substantial commitments for the next four months. It is possible that we can not meet it and we have so advised the NHTS Administrator, General Curry.

In the second phase of the study, as it is currently envisioned, the Committee will analyze in greater detail the principal barriers to the commercial application of technologies to improve fuel efficiency. We also anticipate that the Committee will address measures to overcome these barriers. A more specific definition of the second phase will be developed as the first phase of the study unfolds. The report of Phase 2, following Academy review, is scheduled to be completed by March 31, 1992.

THE COMMITTEE

We are in the process of appointing the committee to carry out this study. The committee will reflect the range of expertise needed to deal with the issues underlying the study. This expertise will include areas such as the following: automotive technology, fuels, manufacturing, environment, safety, financial practices and markets, federal and state regulations, consumer behavior, and automotive industry/U.S. economy interactions.

The Committee will invite presentations, to be delivered at committee meetings and in the Phase 1 workshop, from domestic and foreign automobile manufacturers and their suppliers; from representatives of qualified organizations closely involved with but functioning outside of the automotive industry per se; from other relevant parties (individuals, firms and other entities in the private sector, and government agencies).

The Committee will avail itself of the data in the public domain and obtain or develop new information, as needed, for its deliberations. Additionally, the Committee may commission expert written reviews of selected topics, for example, tradeoffs in automotive design of weight versus safety.

THE NRC PROCESS

NRC studies gain their credibility from a number of elements of our process and procedures that in aggregate make our studies of technical and scientific issues and our recommendations to government somewhat distinctive. Key elements of the NRC approach are:

Independence. As an institution we are totally independent of government even though we are chartered by Congress to advise government. We guard this independence carefully, making sure we are not influenced by either government or organizations and individuals.

Voluntary Public Service. The thousands of scientists, engineers, physicians and health care workers, and others, who serve on NRC committees do so without compensation. Thus, their advice is not "contracted for" in the usual sense. The Research Council itself receives no fee from government for its services.

Appointment of Expert but Balanced Committees. In each project we attempt to assemble a knowledgeable, technically expert panel. We also assemble a balanced panel in its overall mix of scientific expertise and perspective. We seek analysis. Individuals known to have extreme views on issues central to the study are often invited to present their advocacy position to the committee rather than being invited to serve on the committee itself.

Expert Staff. A staff of professional science, technology, and public policy analysts at the National Research Council serve the appointed panels of individuals who contribute their time to the NRC. The staff assigned to a study is experienced and technically expert.

Examination of Potential Sources of Bias and Conflicts of Interest. All members of the NRC panels are required to complete a statement that outlines financial interests, public statements and positions on subjects, past government service, current research support by government and industry and other information relevant to the task at hand. Additionally, the committee at an early meeting itself reviews these issues. On some occasions we ask an individual to step down because of a conflict.

Consensus Reports With Recommendation. The NRC strives to achieve consensus reports. Occasionally we do not. And, we strive to reach clear conclusions and recommendations as reports with conclusions and recommendations are more helpful to public officials in the Executive Branch agencies and the Congress than reports that offer various points of scientific view.

Review. All reports of the National Research Council are reviewed by a group of experts other than the authors prior to their release. The review process adds further to the credibility of the report. The review process is supervised by a report review committee whose members are all members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

Finally, undergirding this process is the credibility of the Academy of Sciences whose 1863 Congressional charter established it as the premier scientific advisor to the government of the United States and as a public service organization.

CONCLUSION

Thank you for the opportunity to describe the study of automotive fuel efficiency we have now begun. We know the deep interest this committee and others of the Congress have in our work as well as the keen interest of the Administration, the private sector, and public interest organizations. We will endeavor to fulfill the trust placed in us.

The CHAIRMAN. Thank you very much indeed, Dr. Smith.

Dr. Lashof.

STATEMENT OF DR. DANIEL A. LASHOF, SENIOR SCIENTIST, NATURAL RESOURCES DEFENSE COUNCIL

Dr. LASHOF. Thank you, Mr. Chairman.

I appreciate the opportunity to testify here today on behalf of, in addition to NRDC, 11 other members of the Energy Conservation Coalition.

Mr. Chairman, 18 months ago when the Department of Energy announced it was developing a natural energy strategy, I had high hopes for that strategy. And NRDC and other members of ECC worked very hard with the Department to bring forward analysis of energy policy issues and energy efficiency initiatives.

And we think we made a lot of progress. We think we reached quite a bit of consensus with the staff at DOE charged with developing that strategy. Unfortunately, the initiatives that we worked on and recommended and that many people on the staff thought were a good idea did not make it into the final strategy. Those initiatives were hijacked on the way to the White House by political and ideological considerations. And so what we have is a national energy strategy that just does not do the job that it needs to do.

Unfortunately, Mr. Chairman, we must also oppose S. 341 because it suffers from the same critical flaws as the administration's proposal. While S. 341 does contain some slightly more encouragement for energy efficiency, this does not make it an acceptable policy. A sound policy cannot be achieved, in our view, by trading one pet proposal for another. The result would be inconsistent, unworkable, and unsupportable.

A sound proposal must be based on a least-cost plan that to the extent they compete balances the objectives of the Nation in environmental protection, energy security and economic competitiveness. And because energy efficiency in general, and 45 miles per gallon in particular, promote all of these objectives, we believe that these measures must form the cornerstone of a sound policy.

A sound policy may include measures to augment our Nation's energy supplies if it can be shown that those policies meet the national objectives at least cost to society.

But we cannot support a policy that sacrifices irreplaceable natural resources such as the Arctic National Wildlife Refuge, nor one that provides billions of dollars in subsidies to particular industries, out of all proportion to each sector's ability to contribute to a sustainable least-cost energy future.

Let me turn to the need for increase in automotive fuel economy. I think that can be summed up with one very salient fact. The United States is responsible for 26 percent of world oil consumption. Yet, we have remaining only 3 percent of world oil reserves.

There is simply no way we can produce our way to energy security. It cannot significantly affect the world market price or the world market for oil. The only way we can insulate our economy from price shocks is by improving our efficiency and reducing our total consumption for oil. And that fact was actually noted in the National Energy Strategy—although they did not go on to propose policies that reflect that.

Let me discuss briefly the savings that can be achieved from automotive fuel efficiency. That issue has come up and NRDC has done an independent analysis of it. Our studies show that achieving a 60 percent improvement in light vehicle efficiency by 2000 would save 1.3 million barrels of oil per day in that year and 4.3 million barrels per day in 2010 with continued improvements, compared with the scenario in which fuel efficiency stays at current levels.

Over 30 years, the total savings would be over 30 billion barrels of oil—more than 50 times the risked mean estimate of the oil resources in the Arctic National Wildlife Refuge.

Now Secretary Watkins has testified that the Bryan Bill, S. 279, would only save .5 million barrels per day in the year 2000. In addition to the fact that he cites a year long before that policy reaches its maximum impact, the largest discrepancy between his calculation and ours is that he assumes that the market will lead to 34 miles per gallon by the year 2000 in the absence of any policy.

We calculate that the Bryan bill will save 1.2 million barrels per day in 2000 and 2.9 million barrels per day in 2010, about the peak year of savings for that legislation.

The Administration's assumption that you would get 33 miles per gallon in the absence of any new legislation seems very questionable in light of current trends where fuel efficiency of new cars seems to be going down.

But in any case, the argument is primarily over how much oil would be used in the absence of S. 279 rather than over how much oil would be used with that legislation. And, in fact, an additional advantage of having fuel efficiency legislation is that it will reduce uncertainty about future oil demand.

Let me touch on the issue of economic competitiveness of our oil industry very briefly. Every other wealthy, industrialized country in the world has adopted a policy of stabilizing or reducing their carbon dioxide emissions by the year 2000.

The United States will eventually find it impossible to resist the pressure to adopt a similar target. The question is whether our industry will be in a position to produce the cars that we will need to meet that target or whether we will end up importing those cars from abroad, because those industries are already moving to meet the targets that have been adopted in Europe and Japan.

Another issue that has been raised is whether the CAFE legislation is to be mandated by Congress or at the discretion of the Department of Transportation. Given the critical need to achieve the fuel efficiency achievements that I have discussed, we think it is imperative that Congress specifically mandate improvements in fuel efficiency.

Leaving the decision to a body that has shown itself hostile in the past of fuel efficiency improvements that has rolled back standards in the past, we think just leaves the process open to delay and unproductive lawsuits. It will encourage the industry to spend its precious resources not in figuring out how to meet the standard, but, instead, in trying to convince the Department of Transportation that the standard cannot be met or that significant improvements cannot be had.

With regard to the technology for achieving the standard, a 45 miles per gallon car need not be wimpy or tiny, as some of the discussion earlier seems to suggest. ACEEE's analysis that was put on the record at hearings last week—which is quite conservative—shows that 44 miles per gallon in the year 2000 is possible with the size and performance characteristics of the 1987 fleet.

And by putting that standard out there, that will provide the market certainty that the industry needs to justify investments that focus on improving fuel efficiency, rather than other things that the industry might do in the interim period—both in terms of their marketing and investments.

The **Chairman**. Dr. Lashof, I hate to do this but I have got to ask you to sum up so we can get through the witnesses.

Dr. **Lashof**. Okay, let me just touch on the issue of size and safety, because there was a lot of discussion this morning. And I think that there has been a lot of confusion there.

I have two children. And I want to drive a safe, family car. And I am convinced that fuel efficiency legislation will make that easier and not more difficult. Let me note just a couple of salient points.

From 1978 to 1988, the volume of the fleet remained approximately constant, the interior volume, and fuel efficiency went up by 44 percent. We have already heard that the weight has remained constant since 1980 while fuel efficiency went up.

Isolating out the size of the vehicles is quite arbitrary. For example, the Rolls Royce Corniche III and the Geo Metro are both classified as subcompact cars. But obviously they do not have very many other features in common.

With regard to the downsizing study that was cited by the Department of Transportation for their estimate of fatalities, that does not stand up to scrutiny.

When you adjust their data for changes in the vehicle miles traveled between the older cars, the pre-downsize cars, and the new ones which are driven more, the claimed relationship between downsizing and fatalities disappears from the data. Some cars did better, some did worse. Overall, there is no clear relationship at all.

With regard to——

The **Chairman**. Would that not also argue that downsizing does not save gasoline?

Dr. **Lashof**. No, sir. The issue is—their studies focus specifically on the relationship between vehicles that were downsized and how many fatalities there were. Driving is increased for many factors, not just that.

The **Chairman**. I understand.

Dr. **Lashof**. Finally, with regard to weight, let me just note one example. While this comparison is only valid for single vehicle collisions, the 5,710 pound Ford Club Wagon Van has a three-times worse head injury criterion, according to NHTSA's test, than the 2,060 pound Geo Metro. So clearly, weight alone does not tell you how safe vehicles will be. It can be one factor, but there are ways of reducing weight without reducing the structural integrity of the vehicles through substitution of lighter, stronger materials, for example.

So in conclusion, Mr. Chairman, we strongly believe that Congress should mandate fuel efficiency improvements. We also would like to have safer cars. And we think that that should be addressed directly and not be done thorough losing the momentum for fuel efficiency.

Thank you.

[The prepared statement of Dr. Lashof follows:]

PREPARED STATEMENT OF DR. DANIEL A. LASHOF, SENIOR SCIENTIST, NATURAL RESOURCES DEFENSE COUNCIL

INTRODUCTION

Thank you Mr. Chairman and members of the Committee. I am Daniel Lashof, a senior scientist with the Natural Resources Defense Council (NRDC). I appreciate the opportunity to testify on behalf of NRDC and the Energy Conservation Coalition.

NRDC is a non-profit environmental protection organization, founded in 1970 and supported by 160,000 members. NRDC's Energy Program has more than ten years of experience in promoting energy efficiency and least-cost energy planning. Today I am also representing the following members of the Energy Conservation Coalition: American Council for an Energy Efficient Economy, Environmental Action, Friends of the Earth, National Wildlife Federation, National Audubon Society, Public Citizen, Renew America, Sierra Club, Union of Concerned Scientists, United Methodist Church Board of Church and Society, and U.S. Public Interest Research Group.

THE ENERGY POLICY CONTEXT

Mr. Chairman, a broad spectrum of environmental, energy, religious, and citizens groups wrote to President Bush on December 7, 1990 to outline specific objectives and policies that would comprise an effective national energy policy. We called on the President to propose a policy that minimizes the cost of energy services to the nation, reduces environmental damage, slows global warming, and enhances the competitiveness of America's industries. Increasing the average fuel efficiency of new light vehicles 60% within a decade was specifically emphasized as one critical element of such a policy. Unfortunately, the President has failed to propose a policy that would achieve these goals. The Congress still has the opportunity and responsibility to do so.

Mr. Chairman, we must oppose S. 341 because it suffers from the same critical flaws as the Administration's National Energy Strategy proposal. While S. 341 may provide slightly more encouragement for energy efficiency, this does not make it an acceptable policy. A sound policy cannot be achieved by trading one pet proposal for another. The result would be inconsistent, unworkable, and unsupportable.

A sound proposal would be a least-cost plan that, to the extent that they compete, balances the objectives of environmental protection, energy security, and economic competitiveness. Because energy efficiency in general, and 45 mile-per-gallon cars in particular, promote all of these objectives these must form the cornerstone of a sound energy policy. A sound policy may include measures to augment energy supplies to the extent that these measures can be shown to promote our national objectives at least cost. But we cannot support a policy that sacrifices irreplaceable natural resources, like the Arctic National Wildlife Refuge, nor one that provides billions of dollars in subsidies to particular industries out of all proportion to each sector's ability to contribute to a sustainable least-cost energy future.

THE NEED TO INCREASE AUTOMOTIVE FUEL EFFICIENCY

Ensuring that the average efficiency of new cars and light trucks increases by at least 60% by the year 2000 is the single most important step that Congress can take to increase America's energy security, curb global warming, and position the U.S. auto industry for the 21st Century.

The United States is responsible for 26% of global oil consumption but contains only 3% of global oil reserves.[1] Thus increasing the amount of useful work that Americans get from each barrel of oil is the most important action we can take to reduce the power of oil-rich dictators and insulate our economy from price shocks generated in world oil markets. Increasing domestic production can have only a marginal and temporary impact. Indeed, even the Administration's National Energy Strategy acknowledges that "Popular opinion aside, our vulnerability to price shocks is not determined by how much oil we import. Our vulnerability to oil price shocks is more directly linked to: (1) how oil dependent our economy is; (2) our capacity for switching to alternative fuels; (3) reserve oil stocks around the world; and (4) the spare worldwide oil production capacity that can be quickly brought on line." (Page 3.)

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[1] British Petroleum Company, *BP Statistical Review of World Energy,* June 1990.

My colleague, Robert Watson, has recently completed a systematic analysis of potential oil resources from both increased energy efficiency and increased domestic production.[2] This study shows that the largest incremental oil resource available to the country is increasing the efficiency of our light vehicle fleet. Achieving a 60% improvement by 2000 would save 1.3 million barrels of oil per day (MBD) in that year and 4.3 MBD in 2010 with continued improvements, compared with a scenario in which fuel efficiency remains constant at current levels. Over 30 years total oil savings would amount to over 30 billion barrels, 50 times the risked mean estimate of the recoverable oil resources in the Arctic National Wildlife Refuge.

Secretary Watkins has recently suggested that fuel savings from S. 279 would be only 0.5 MBD in 2000. In addition to citing a year well before the full impact of this legislation would be felt, the largest discrepancy between this calculation and NRDC's comparable calculation for a 40% fuel economy increase by 2000, 1.2 MBD in 2000 and 2.9 MBD in 2010, is that DOE assumed fuel efficiency improvements to almost 33 mpg in 2000 even in the absence of new legislation.[3] This assumption seems highly questionable given recent trends, but in any case the argument is primarily over how much fuel will be used in the absence of S. 279, rather than how much fuel will be used if it is implemented. Indeed a major benefit of effective fuel economy standards is that uncertainty in future oil demand is significantly reduced for two reasons. First, uncertainty about fuel efficiency is greatly reduced by the standard, and second, the impact of uncertainty in future vehicle miles traveled is reduced by cutting the fuel used per mile.

A secondary difference between DOE's calculation and ours is that DOE assumes a 20% reduction in the fuel savings from efficiency improvements because DOE expects people to drive more as fuel costs are reduced by efficiency increases. Again, this assumption is questionable given the amount of time people would already be spending in their cars, but in any case this is a rather minor effect, and in no way negates the overall impact of fuel efficiency standards as has been suggested by General Motors.

In addition to saving oil, increasing automotive fuel efficiency is essential to combating global warming. Light vehicles in the United States are responsible for emissions of 270 million metric tons of carbon,[4] more than total fossil fuel emissions from India, the sixth ranking country in the world.[5] Every wealthy industrialized country in the world, except the United States, has committed individually or collectively to stabilize or reduce its CO_2 emissions by the year 2000. Thus our competitors are already planning for increases in automotive fuel efficiency to meet this goal. Eventually the United States will find it impossible to continue resisting domestic and international pressure to adopt an environmentally responsible global warming policy. Enacting fuel efficiency legislation now will ensure that our auto industry will be in a competitive position when that occurs.

Finally, reducing oil consumption will reduce other major environmental impacts of oil production and transportation, such as accidental and routine oil spills. At the same time, efficiency improvements are fully compatible with achieving the reductions in tailpipe emissions mandated by the Clean Air Act Amendments of 1990.[6]

AUTOMOTIVE TECHNOLOGY FOR A 60% IMPROVEMENT IN FUEL ECONOMY

Given the critical reasons to increase light vehicle fuel economy and the availability of cost-effective efficiency technology, we strongly believe that Congress should specifically mandate an increase in efficiency of 60% by the year 2000. Legislatively mandating the improvement will ensure that the manufacturers devote their resources to meeting the requirement rather than attempting to convince the Secretary of Transportation that efficiency increases cannot be achieved. Leaving the choice of the actual standard level to regulators that rolled back previous standards and are on record as hostile to future increases invites ineffective requirements and unproductive law suits.

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[2] R. Watson, *Searching for Oil in All the Wrong Places: Facts About Oil, Natural Gas and Efficiency Resources* (Natural Resources Defense Council, February 1991).

[3] Personal communication with Barry McNut, DOE, February 26, 1991.

[4] Ledbetter and DeCicco, statement before the Consumer Subcommittee, Senate Committee on Commerce, Science and Transportation, February 21, 1991.

[5] D. Lashof and E. Washburn, *The Statehouse Effect: State Policies to Cool the Greenhouse* (Natural Resources Defense Council, July 1990).

[6] See J. Hair, Statement before the Subcommittee of the Senate Committee on Commerce, Science, and Transportation, February 21, 1991.

Testimony by the American Council for an Energy Efficient Economy (ACEEE) and the International Institute for Energy Conservation (IIEC) at last week's hearing before the Consumer Subcommittee demonstrates that an average fuel economy of 44 miles per gallon can be cost-effectively achieved using proven technology.[7] Many of these technologies are used selectively in current product lines. Large increases in fuel economy can be achieved by expanding the use of technologies such as front wheel drive, reduced aerodynamic drag, and 4-valve per cylinder engines to all applicable vehicles. Additional technologies that can be commercialized by 2000 include aggressive transmission management, idle off, and electronic power steering.

The cost-effective year 2000 potential estimated by ACEEE is in fact very conservative for several reasons. First, cost effectiveness was based on a 7% discount rate and market prices for gasoline. As a matter of policy, cost-effectiveness should be based on a social discount rate of 3% and on a social cost of fuel including energy security and environmental impacts. Second, only already proven technologies were included in ACEEE's analysis. Progress during the next decade could almost certainly make additional technologies cost effective, such as various advanced engine concepts.

VEHICLE ATTRIBUTES

ACEEE's calculation of potential fuel efficiency improvements by 2000 assumes that average vehicle size and perfomance is equal to that of the 1987 new car fleet. In recent years manufacturers have concentrated on increasing acceleration while allowing fuel economy to stagnate or decline.[8] Given current marketing practices and uncertainty about future fuel prices, this trend is likely to continue without new federal policies to encourage greater efficiency. The objective of national policy should not be to ensure particular acceleration levels, but to ensure improvements in automotive fuel economy. Fuel economy legislation will provide manufacturers the market certainty needed to justify investments in the development and implementation of technology focused on fuel savings.

Vehicle interior volume remained essentially constant between 1978 and 1988 while fuel economy increased by 44% [9] There is no reason why this trend should change in the future, despite the protestations of the auto industry. Recall what the industry said about proposed CAFE standards in 1974, "It would require a Ford product line consisting of either all sub-pinto sized vehicles or some mix of vehicles ranging from a sub-sub-compact to perhaps a maverick." [10]

Tying efficiency standards to vehicle size classes would add unnecessary complexity and invite game-playing. Size is also only one of many characteristics that affect vehicle utility and safety. Choosing to isolate this one variable is arbitrary. For example, the Rolls Royce Coniche Mark III (13 mpg highway) and the Geo Metro XFI (58 mpg highway) are both classified as subcompact cars, but have little else in common.

Similarly, the claimed relationship between safety and fuel consumption does not bear up to scrutiny. For example, the relationship between fatalities and downsizing claimed by the Insurance Highway Safety Institute disappears when their data are adjusted for changes in vehicle miles traveled.[11] Specific examples are also telling. While the comparison is only valid for single car collisions, the Head Injury Criteria as measured by the National Highway Safety Administration is almost three times worse for the 5710 pound Ford Club Wagon Van than for the 2060 pound Geo Metro.[12] If the auto industry is really concerned about safety, let the manufacturers propose legislation that would make all cars, and particularly light trucks, safer.

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[7] M. Ledbetter and J. DeCicco, op cit.; D. Bleviss, Statement before the Consumer Subcommittee, Senate Committee on Commerce, Science, and Transportation, February 21, 1991.

[8] Ledbetter and DeCicco, op cit.

[9] Motor Vehicles Facts and Figure, Motor Vehicle Manufacturers Association of the United States, Inc., 1990.

[10] Statement of the Ford Motor Company before the Senate Commerce Committee, 1974.

[11] Ledbetter and DeCicco, op cit.

[12] Ford Club Wagon Van HIC is 2613 driver side; the Geo Metro, two door HIC is 951 driver side. For further discussion of HIC vs. vehicle weight see Ledbetter and DeCicco, op cit.

CAFE CREDITS

We strongly oppose any expansion of CAFE credits that would have the effect of reducing fuel efficiency requirements. In particular, given standards that are increased in only two steps, which already gives manufacturers substantial flexibility, it is absurd to allow credits for exceeding the standards in effect in any given year. Manufacturers will have to phase efficiency improvements into their product lines so they would be certain to exceed current standards before 1996, and 1996 standards before 2001. Allowing such credits to be carried forward would simply gut the standards until all credits were exhausted.

Similarly, removing the cap on CAFE credits for flexible fueled vehicles would simply amount to repealing CAFE. As there is no requirement that alternative fuels would actually be used in flexible fueled vehicles, we could easily have a complete fleet of gasoline guzzlers that achieve CAFE standards through credits, but never use a drop of alternative fuel. A policy of promoting use of alternative fuels should do so directly through mandates or incentives, not through CAFE credits. Similarly, any policies to promote safety or scrappage of older cars should use direct mandates or incentives, not CAFE credits.

ENSURING COMPLIANCE

Failure to meet CAFE standards is a violation of the law and should be treated as such. Manufacturers have argued that it is difficult to ensure compliance because consumers are not interested in more efficient vehicles. Leaving aside the role of manufacturers' advertising in shaping consumer demand, this potential problem should be addressed by complementing CAFE legislation with market incentives, not by making it lawful to violate CAFE. Point of purchase fees on less-than-average efficiency vehicles should be used to provide rebates for more-than-average efficiency models. The zero point for the systems can be adjusted annually to ensure that the system remains revenue neutral, while the level of the fee can be set to ensure a market demand to achieve CAFE standards.

CONCLUSION

The goal of national energy policy should be to minimize the cost of energy services to the nation, reduce environmental damage, slow global warming, and enhance the competitiveness of America's industries. Increasing the average fuel efficiency of new light vehicles 60% within a decade is among the most important components of a sound policy. The CAFE provisions of S. 341 totally fail to achieve this goal, and S. 341 as a whole fails to provide a least-cost energy policy to promote our national objectives.

The CHAIRMAN. Thank you very much.

Mr. Boltz.

STATEMENT OF RONALD R. BOLTZ, VICE PRESIDENT, PRODUCT STRATEGY AND REGULATORY AFFAIRS, CHRYSLER CORP.

Mr. BOLTZ. Thank you, Mr. Chairman.

Chrysler appreciates the opportunity to appear before the committee to present our views on title XI of S. 341. And Chrysler applauds the committee's desire to craft a comprehensive and balanced energy policy.

I would like to say that we are willing to work with the committee to address energy conservation issues in the automotive sector.

We believe technology exists to improve car and truck fuel efficiency. Chrysler will continue to apply these technologies and expand their use in our future products. And we will also fulfill our responsibility to our customers to produce vehicles that are safe, reliable, environmentally sound and affordable.

Although continued fuel efficiency improvements are certain, the CAFE results of these improvements are not. Because CAFE depends, in part, on the size, mix of vehicles our customers demand.

And vehicle size, mix, depends, in part, on the price of fuel. So there are no simple solutions to increasing CAFE.

We do know what will work: moderate, but sustained increases in fuel efficiency, coupled with moderate but continuous increases in gasoline taxes. Harness market forces in tandem with fuel efficiency improvements, and let both horses pull the wagon of national interest.

We also know, however, that taxation is not possible. Translated into English, I guess that means it is politically difficult. So energy policy for the transportation sector will focus on fuel efficiency alone. Or, more likely, its second-cousin, twice-removed, CAFE. Because fuel efficiency and CAFE are not the same things.

Which brings us to the matter at hand, which is title XI. Let me summarize Chrysler's position at the outset. We support the directed rulemaking contemplated in title XI.

We vigorously oppose extreme CAFE legislation such as S. 279 and its predecessor, S. 1224. The proposed requirements of S. 279 are unreasonable and unfounded. The bill is not feasible. I will submit copies of Chrysler statements on S. 279 and S. 1224 to support these views for the record of this hearing.

In fact, there is an acute lack of reliable—reliable information available to Congress about the CAFE issue and about the capability of the industry to achieve significant new vehicle fleet average fuel economy increases.

Title XI of S. 341 addresses these issues by requiring the Secretary of Transportation to determine the maximum feasible fuel economy and providing criteria that the Secretary must consider.

In fact, this process is already underway, as you heard this morning. DOT recently began a study with the National Academy of Sciences to get these answers. Initial results will be available by the end of June 1991. And the complete study will be available by the end of March 1992.

Title XI is a balanced and reasonable approach. It will yield reliable information that is necessary to determine CAFE capability. We do suggest that to better address safety concerns that the criteria should ensure consideration of the safety effect for the maximum, feasible fuel economy standards.

Chrysler also supports the percentage increase CAFE structure proposed in title XI. This approach will result in the maximum, new vehicle, fleet average fuel economy. Therefore, it will provide a higher energy conservation benefits than either an absolute standard or a series of vehicle size, class standards, VAFE, as I heard them this morning. And the percentage increase will not require down-sizing if the increase is reasonable and based on cost-efficient technologies.

My testimony also includes several items regarding CAFE credit trading provisions that we believe have the effect of monitorizing CAFE performance above the standard set by DOT. And to the extent a market for credits develops, the approach rewards manufacturers who, in fact, exceed the performance standards.

We cannot comment today on specific credit-trading ideas. But I do want to tell you that we favor the continuation of CAFE credits because they do offer manufacturers flexibility to smooth peaks and valleys in CAFE performance.

And the air bag credit provisions for small cars provide manufacturers an incentive to use this safety technology. These provisions help reduce safety concerns related to more stringent CAFE standards. We do suggest that the committee reconsider the effective date for the initial standard.

As you know, stringent Federal law exhaust emissions standards will phase in over a 3-year period beginning in 1994. That is the 1994 model year. We believe these standards will fully absorb available technical resources. And new CAFE standards in 1996 pile on top of the emissions reduction effort. We believe the initial CAFE standard should take effect no sooner than 1997.

In addition, the excessive consumption fee should not change in advance of new CAFE standards. We suggest dropping the $10 fee proposed for 1993 through 1995, and continuing the present $5 fee until the initial phase of the new standards take effect.

The increase in fees appears related to provisions for the scrappage of older vehicles. We believe the bill should specify criteria to guide the Secretary of Energy and the EPA Administrator in these efforts, and to qualify State and other energy conservation programs that would claim funds under the excessive consumption fund.

We would like to work with the committee staff and the committee to develop these criteria, and to clarify other elements of S. 341.

In summary, Mr. Chairman, our suggestions simply underscore Chrysler's general support of the concepts included in the bill. We believe title XI will help achieve the energy policy goals of S. 341.

Thank you.

[The prepared statement of Mr. Boltz follows:]

PREPARED STATEMENT OF RONALD R. BOLTZ, VICE PRESIDENT, PRODUCT STRATEGY AND REGULATORY AFFAIRS, CHRYSLER CORP.

Thank you, and good morning. I am Ronald R. Boltz, Vice President, Product Strategy and Regulatory Affairs for Chrysler Corporation. Chrysler appreciates the opportunity to appear before the Committee to present our views on Title XI of S. 341.

Chrysler applauds the Committee's desire to craft a comprehensive and balanced energy policy. And we are willing to work with the Committee to address energy conservation issues in the automotive sector.

We believe technology exists to improve car and truck fuel efficiency. Chrysler will continue to apply these technologies, and expand their use in our future products. And we will also fulfill our responsibility to our customers to produce vehicles that are safe, reliable, environmentally sound and affordable.

Although continued fuel efficiency improvements are certain, the CAFE results of these improvements are not. Because, CAFE depends on the size mix of vehicles our customers demand. And vehicle size mix depends in part on the price of fuel. So, there are no simple solutions to increasing CAFE.

We do know what will work. Moderate but sustained increases in fuel efficiency. Coupled with moderate but continuous increases in gasoline taxes. Harness market forces in tandem with fuel efficiency improvements. And let both horses pull the wagon of National interest.

We also know, however that taxation is "not possible". Translated into English that means it's "politically difficult". So, energy policy for the transportation sector will focus on efficiency improvement alone. Or, more likely, its second cousin, twice removed—CAFE.

Which brings us to the matter at hand, Title XI. Let me summarize Chrysler's position at the outset. We support the directed rulemaking contemplated in Title XI.

We vigorously oppose extreme CAFE legislation, such as S. 279 and its predecessor S. 1224. The proposed requirements of S. 279 are unreasonable and unfounded.

The bill is not feasible. I submit copies of Chrysler's statements on S. 279 and S. 1224 to support these views, for the record of this hearing.

In fact, there is an acute lack of reliable information available to Congress about the CAFE issue. And about the capability of the industry to achieve significant new vehicle fleet average fuel economy increases.

Title XI of S. 341 addresses these issues. By requiring Secretary of Transportation (DOT) to determine the maximum feasible fuel economy. And, by providing criteria that the Secretary must consider. In fact, this process is already underway. DOT recently began a study with NAS to get these answers. Initial results will be available by the end of June 1991, and the complete study will be available by the end of March 1992.

Title XI is a balanced and reasonable approach. It will yield reliable information needed to determine CAFE capability. To better address safety concerns, we suggest the criteria include consideration of the safety effect for the maximum feasible fuel economy standards.

Chrysler supports the percentage increase CAFE structure proposed in Title XI. This approach will result in maximum new vehicle fleet average fuel economy. Therefore, it will provide higher energy conservation benefits than either an absolute standard or a series of vehicle size class standards. And a percentage increase will not require downsizing if the increase is reasonable and based on cost efficient technologies.

The CAFE credit trading provisions have the effect of monetarizing CAFE performance above the standards set by DOT. To the extent a market for credits develops, the approach rewards manufacturers who exceed the standards. We cannot comment today on specific credit trading ideas. We do favor the continuation of CAFE credits, because they offer flexibility to smooth peaks and valleys in CAFE performance.

And, the airbag credit provisions for small cars provide manufacturers an incentive to use this safety technology. These provisions help reduce safety concerns related to more stringent CAFE standards.

Chrysler suggests the Committee reconsider the effective date for the initial standard. Stringent Federal exhaust emission standards phase-in over a three year period beginning in 1994. These standards will fully absorb available technical resources. And new CAFE standards in 1996 pile on top of the emissions reduction effort. We believe the initial CAFE standards should take effect no sooner than 1997.

In addition, the excessive consumption fee should not change in advance of new CAFE standards. We suggest dropping the $10 fee for 1993-95. And continuing the present $5 fee until the initial phase of the new standards takes effect.

The increase in fees appears related to provisions for the scrappage of older vehicles. The bill should specify criteria to guide the Secretary of Energy and the EPA Administrator in these efforts. And to qualify State and other energy conservation programs that would claim these funds.

We would like to work with the Committee Staff to develop these criteria, and to clarify other elements of S. 341.

In summary, our suggestions simply underscore Chrysler's general support of the concepts included in the bill. We believe Title XI will help achieve the energy policy goals of S. 341.

Thank you for your attention.

The CHAIRMAN. Thank you very much, Mr. Boltz.

Mr. Pestillo.

STATEMENT OF PETER J. PESTILLO, VICE PRESIDENT, CORPORATE RELATIONS AND DIVERSIFIED BUSINESSES, FORD MOTOR CO.

Mr. PESTILLO. Mr. Chairman, thank you.

Mr. Chairman, our Nation has been in a revolution for about the past 15 years. While accommodating significant increases in regulation, we have also found ourselves in a world market with imports in America the highest of any auto-producing Nation. So we had to develop a world-class product. And we have been very active in doing so.

At Ford, for example, our quality has improved more than 70 percent in the past 10 years. At the same time, our productivity has almost doubled. So we have ourselves cost competitive as well as product competitive.

At the same time, we have not ignored our societal responsibilities. We are meeting emission requirements, obviously. And the emissions of our new vehicles are as much as 96 percent better than prior ones. At the same time, we have dramatically improved fuel economy. And the Lincoln Town Car, which was mentioned earlier, today gets greater fuel economy than the smallest car we made 15 years ago. So we have made significant progress there as well.

We are going to continue to improve the fuel economy of our vehicles. It is a competitive obligation of ours. We have to do it to stay in the marketplace. And we are doing so And as each new vehicle comes forward we introduce new technology. We have, as Mr. Beaver indicated, probably done as much with weight as one practically can. There perhaps may be a little bit more to do, but we are reaching cost barriers—barriers imposed upon such things as compounds and graphite, titanium and the like—that are more available to aerospace technology than they are to automotive technology, simply because of cost.

But we will apply new equipment again, often in the face of competing regulation. The fuel mix requirements of clean air, for example, are inimical to the interests of improved fuel economy. We have got to find a way to harmonize the two.

But whatever we do, we are going to fall far short of what would be required in Senator Bryan's bill. And we feel those levels are unattainable. And we applaud the committees objectives, and the conditions the committee would impose upon improving fuel economy.

We are up against several things: the matter of choice. America has a proclivity toward larger cars. We have 45,000 miles of interstate highways. We have had people who had—with the availability of relatively cheap fuel—can indeed afford larger cars. And to some extent, larger cars are, indeed, more practical.

We have regulations to meet, as we have indicated. We are going to spend more than $2 billion in accommodating clean air, for example. It is a tremendous drain, both in effort and cost on us.

We have, as well, the issue of cost and a choice. Large as we are, we build cars to order. We do not just give you black, anymore, as we did 70 or 80 years ago. We meet customer choice. That is all we can do. And customer choice plays a great role on the cars we can or do provide.

One significant thing that I would like to dwell briefly on, because it is critical, and it is probably uniquely raised by your committee, sir. You asked the question about should we make assumptions with respect to the ability of the industry to meet these requirements, effectively a cost test. And our view is absolutely.

I think our present situation best demonstrates why we have to be careful how we go about continuing to regulate auto. While the rest of the Nation may wonder whether we are in a technical recession, our industry is clearly in the depression. The kind of lay-offs we have are better known in the 1930's than in the 1980's.

More than one-third of the Ford hourly employees are out of work today. And that is a significantly higher number, a number we have not reached since 1982, the last time we found this great difficulty.

At the same time, we have spent more than $26 billion on product in the last 5 years, and will spend more than that in the next 5 years, in that continuing, growing battle to get and stay competitive.

Mr. Chairman, the efforts you put together in S. 341 recognize the trade-offs in establishing fuel efficiency regulation. And we support the concepts that all manufacturers be given a task under the considerations you have introduced as required of the Department in going forward.

We think more information is required. That is why we have supported the NAS study. But in closing, let me make clear again, we intend to be responsible. We intend, as I have indicated, to improve fuel economy. We are more than willing to work with the Congress in establishing such standards as are seen desirable, consistent with the conditions you have imposed.

With that, sir, I will yield whatever time and be happy to answer such questions that you have.

[The prepared statement of Mr. Pestillo follows:]

Prepared Statement of Peter J. Pestillo, Vice President, Corporate Relations and Diversified Businesses, Ford Motor Co.

Mr. Chairman, thank you for the opportunity to share Ford's views on the important issue of automotive fuel efficiency. We will try to cover many of the areas addressed in your questions. Some, however, require additional research and therefore time to answer comprehensively.

As this committee considers new automotive fuel economy requirements, it is important to reflect on how the industry has changed since 1975 when standards were enacted. Clearly, the industry has undergone a revolution during the last 10-15 years.

We had to make the American product world class because foreign companies improved their products and tripled their market share. From 1980 to 1990, we improved our quality and productivity dramatically to be competitive. The end result is that Ford's car market share climbed 4.5 percentage points between 1981 and 1990.

At the same time, we stepped up to our societal responsibilities. Emissions from our cars have been reduced sharply—as much as 96 percent from pre-controlled vehicles—and will be almost completely eliminated under the new requirements. Safety improvements, along with seat belt use and drunk driving countermeasures, have helped reduce the highway fatality rate to the lowest point in history.

We've improved dramatically the fuel economy of Ford's car fleet. The fuel economy of our largest car—the Lincoln Town Car—is better than the smallest car we built in 1975. And the fuel economy of today's Ford Escort is nearly double the level of its predecessors.

These improvements did not come easily because we make one of the most complicated consumer products—comprised of some 10,000 parts. Yet our products must be reliable and meet a broad range of needs under harsh operating conditions.

But we accept our obligation to continue to make improvements. We expect to hire several hundred new engineers and invest about 2.6 billion to meet the 40-50 new automotive regulations required by last year's revisions to the Clean Air Act. By the mid-1990s, we plan to have driver and passenger air bags on all our cars and almost 50 percent will be equipped with antilock brakes. By 1995, driver-side air bags will be standard on four of seven truck lines and antilock brakes will be available on all truck lines.

We plan to produce substantial numbers of flexible-fuel vehicles beginning in the mid-90s. And we have joined with GM and Chrysler to form a consortium to develop batteries that may make electric vehicles commercially viable.

The committee asked about what fuel economy improvements would be possible in the future. We will continue to improve the fuel economy of our vehicles. Our just-introduced 1992 Crown Victoria and Grand Marquis models incorporate smaller displacement engines, electronically-controlled transmissions that improve shifting efficiency, and substantially improved aerodynamics. The result is a 1-2 mpg fuel economy improvement on those cars versus their 1991 predecessors. This improvement, however, translates to less than a 0.2 mpg improvement in Ford's CAFE because these cars represent a relatively small part of our total volume.

As we redesign each car and truck model in our product cycle, which takes place over a period of years because of the massive human, technical and financial resources required, we will be applying many of these and other technologies—such as multi-valve engines and increased use of light-weight materials. And we're actively pursuing research on advanced technologies such as two-stroke engines, continuously-variable transmissions, lean-burn engines and advanced diesels, although they are not expected to have a major impact on fuel economy capability by 2001.

We expect most fuel efficiency improvements in the time frame addressed in this bill to come from known technologies. The CAFE benefits from these technologies are expected to fall far short of the 20 and 40 percent improvement levels mentioned in other legislation. Because in large part, the weight of a vehicle dictates its fuel economy, reducing size and weight is the only way to achieve significant additional fuel economy improvements. That's a law of physics, not policy.

In considering fuel economy regulation, it must be recognized that there are legitimate competing pressures. S. 341 correctly addresses many of these factors.

First, consumer choice. This country is unique in that there are 3,000 miles between our borders, a well-developed interstate highway system of about 45,000 miles, and a history of cheap gasoline. It's not surprising that American consumers seek relatively larger vehicles than, for example, many smaller European countries that have 3.00 per gallon gasoline and well-developed public transportation systems. S. 341 acknowledges this factor by requiring that any new standards can be met by automobiles with the same size mix and interior volume as presently are available.

Second, safety. All other things being equal, larger and heavier cars are safer cars. In a vehicle crash, larger vehicles have more structure to absorb the energy. This is another law of physics that is not lost on many of our customers. Our studies show that the buyers of our large cars whose median age is 63—rank safety high as a purchase consideration.

Third, other government regulations. The committee also asked about the impact of new safety and emissions standards. Meeting new emissions standards for the mid-199Os requires that engine spark advance and air-fuel mixtures be set at levels that are opposite to what would be required to maximize fuel efficiency. Emissions actions are expected to reduce fuel economy by about a half mile per gallon. 0ther regulations—such as eliminating the use of chlorofluorocarbons in auto air conditioners and new safety standards—will add weight that will subtract another half mpg. So we must undertake substantial fuel economy improvement just to stay even (Chart 1).

Fourth, cost. It may be technically possible to produce a light-weight car made of exotic materials as titanium and graphite composites, but it is likely to raise the cost of a new car beyond the means of most Americans. We understand aerospace technology but we cannot provide these materials at prices our customers can afford or are willing to pay.

The committee also raised one other issue that I would like to comment on briefly—vehicle performance.

At least in Ford's case, the effect of so-called "performance" cars on CAFE is minimal. Even if we eliminated all such cars—which represent only about 7 percent of sales—it would improve our CAFE by only 0.3 mpg. Many of the technologies that improve engine efficiency (e.g., overhead cam and 4-valve per cylinder designs) provide both a horsepower and fuel efficiency improvement. However, in most instances, it is not reasonable or possible to eliminate the additional horsepower and still maintain acceptable acceleration and driveability at low speeds. We know first hand the importance of acceptable performance. When we had to reduce emissions on a tight timetable in the early 1980's, performance and driveability became major customer concerns and it took years to overcome this perception of our products. Going fast is not the issue here. Acceleration has safety implications too as with passing and the time required to reach speed on expressways.

Finally, the committee asked whether the bill should contain an explicit assumption relating to the adverse impact on the auto industry. The present situation illustrates why such a provision would be so important.

We expected the first part of 1991 to be weak, but consumer concern about the Middle East has sent car and truck sales into a much steeper decline than anyone anticipated. Car and truck sales and consumer confidence are at their lowest levels since 1982 (Chart 2).

Dealer retail orders have virtually dried up, despite incentives of up to $1,500 a unit. As a result, we've had to cut production sharply—one third of all Ford workers are on temporary or indefinite layoff (Chart 3).

At the same time, the industry has had to maintain record levels of spending to meet new regulations and competitive pressures. Ford spent $26 billion since 1986 on new products and we expect to spend an even greater amount in the next five years. The end result is a serious deterioration in the financial condition of the domestic industry. Our Fourth Quarter losses amounted to $2.1 billion and First Quarter results could be even worse (Chart 4).

This will affect the amount of money the manufacturers have available to invest and how quickly we are able to improve the fuel economy of our vehicles.

Mr. Chairman, we commend your efforts in putting together S. 341, which recognizes the tradeoffs involved in establishing fuel efficiency regulations and support the concept that all manufacturers be given a task. Importantly, it also looks at energy policy from a comprehensive standpoint. In the transportation sector, it cites probable gains from the combination of efficiency, alternative fuels and system efficiencies such as intelligent vehicle/highway system. If a reduction in petroleum usage be the goal, only such a comprehensive approach can get us there.

But it is hard to comment on fuel economy potential in the abstract. Ultimately, the impact on consumers and the industry will depend on how the Secretary of Transportation or the Congress decides on how to strike a balance among the factors that affect vehicle fuel efficiency. Such assessments should be based on the best available scientific, economic and technical information. Too often, auto regulations have been the result of political compromise, not sound technical judgment.

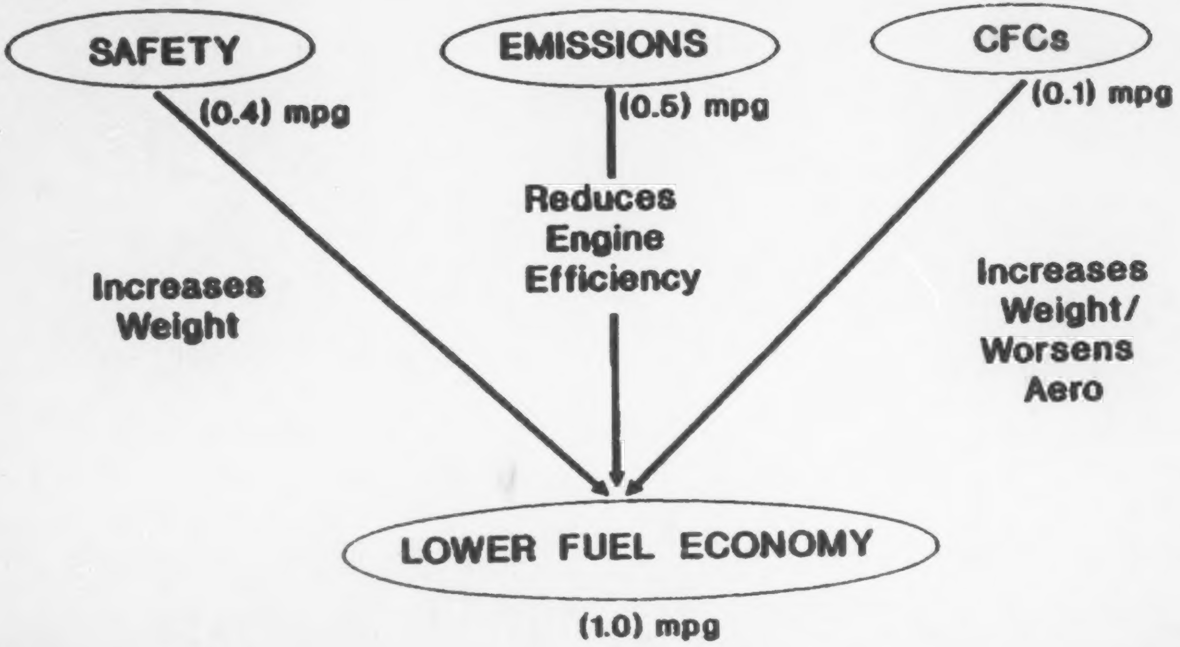
To date, there is no such information. The studies available to Congress are based are hypothetical studies of an assortment of technologies with no substantiation of improvement potential and no acknowledgements of the effect of other regulations or the impact on vehicle affordability. Even the studies' authors later reduced the potential near-term gains by more than half.

That is why it is critically important that the Congress not enact specific fuel economy standards before a comprehensive study can be completed. The National Academy of Sciences is undertaking such a study that will estimate fuel economy levels that can be achieved practically for new cars and trucks.

We intend to be responsible, and we are continuing to improve the fuel economy of our whole fleet—we would do so in order to remain competitive with or without further regulation. We propose awaiting the study, not to delay consideration of auto fuel efficiency, but so that the nation can have a more informed basis for developing what will be a significant portion of its energy policy. We would be pleased to work with the Congress once the study is completed.

Chart 1

FUEL ECONOMY IMPACT OF MID-1990s REGULATIONS



SAFETY

(0.4) mpg

Increases Weight

EMISSIONS

(0.5) mpg

Reduces Engine Efficiency

CFCs

(0.1) mpg

Increases Weight/ Worsens Aero

LOWER FUEL ECONOMY

(1.0) mpg

Chart 2

U.S. Car and Truck

INDUSTRY SAAR AND CONSUMER CONFIDENCE

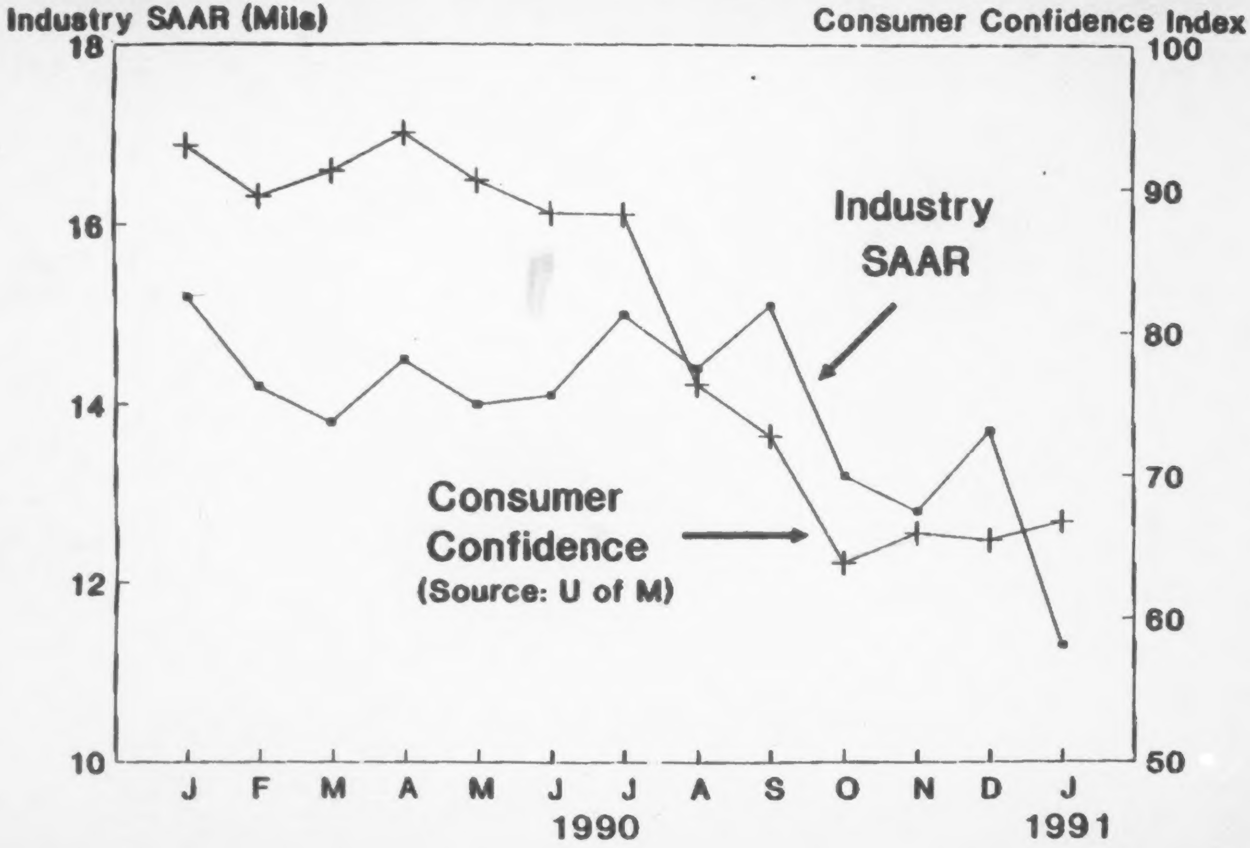
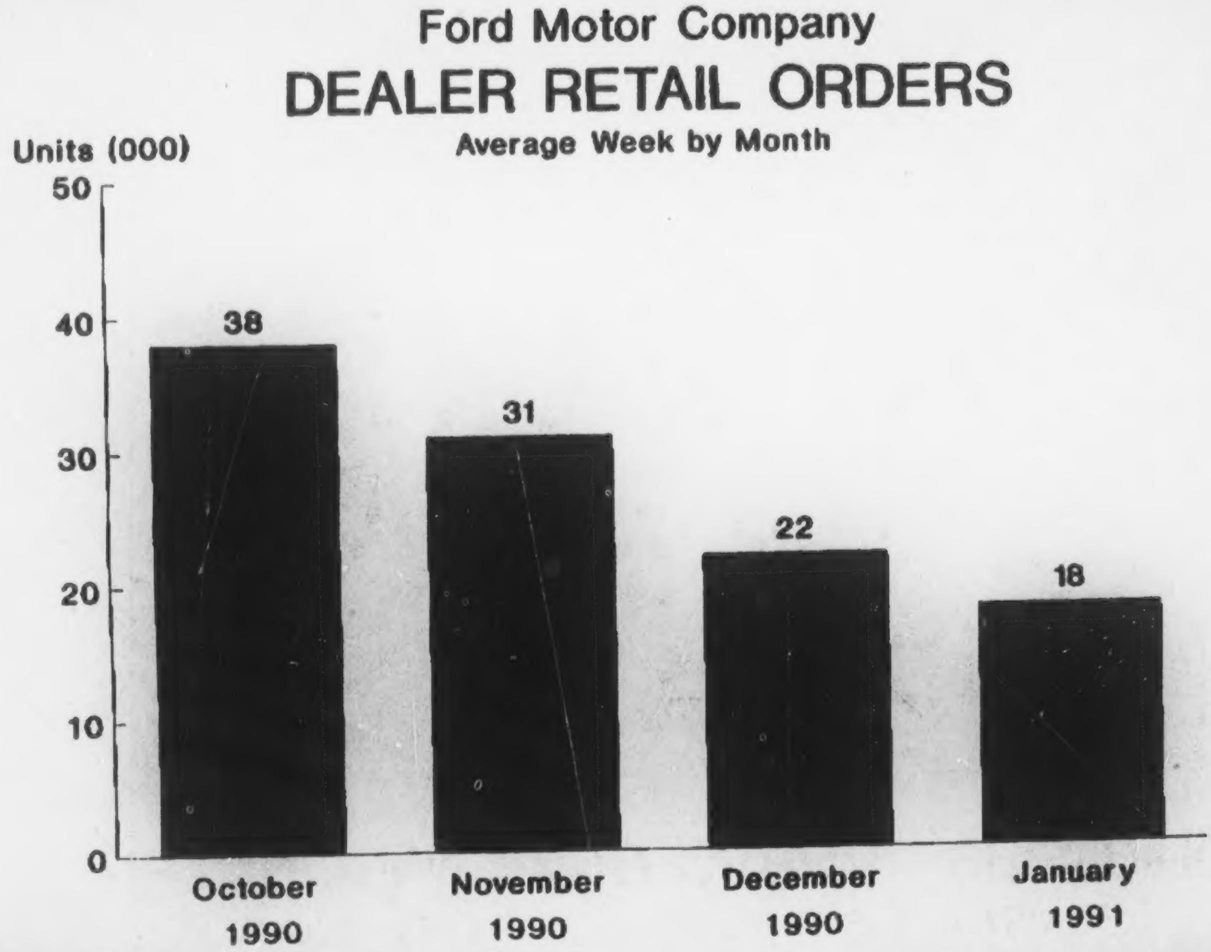


Chart 3



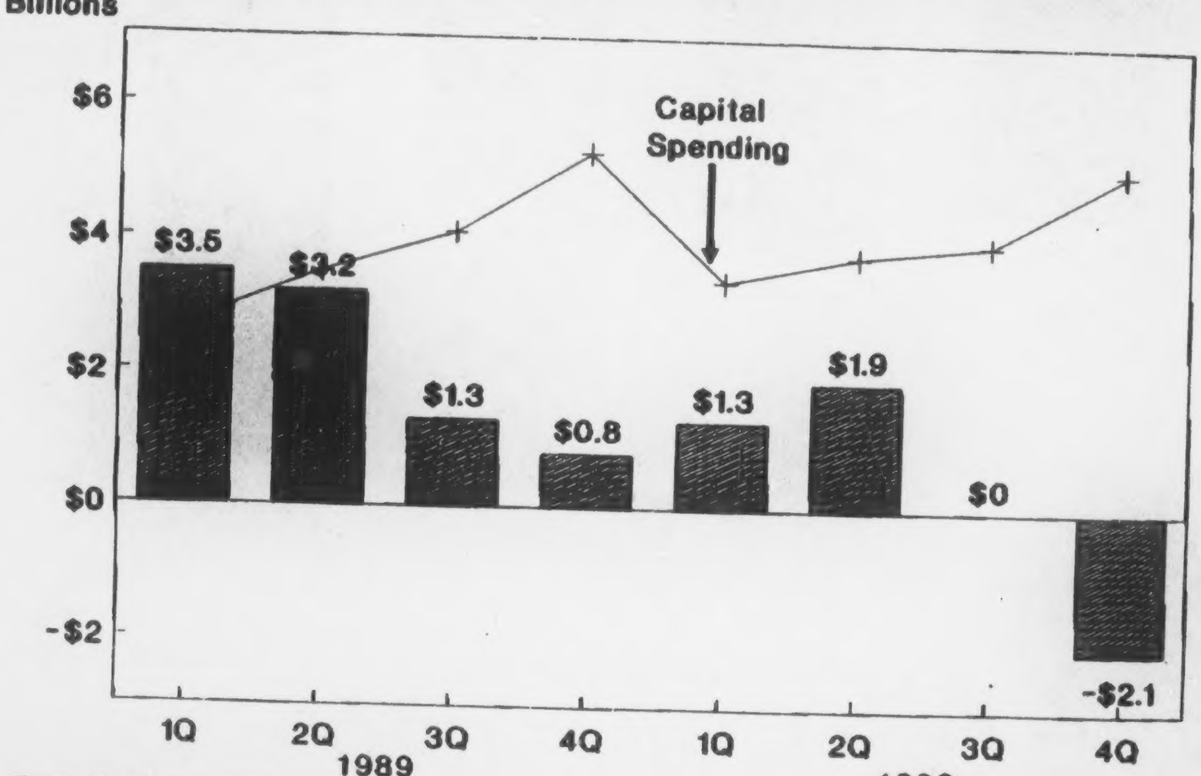
Ford Motor Company

DEALER RETAIL ORDERS

Average Week by Month

Chart 4

Ford, General Motors and Chrysler
NET INCOME * AND CAPITAL SPENDING



* Excluding one-time write-offs

The CHAIRMAN. Thank you very much, Mr. Pestillo.

Next, Ms. Marina Whitman.

STATEMENT OF DR. MARINA v.N. WHITMAN, VICE PRESIDENT AND GROUP EXECUTIVE, PUBLIC AFFAIRS AND MARKETING GROUP, GENERAL MOTORS CORP.

Ms. WHITMAN. Thank you, Mr. Chairman.

As my colleague has just pointed out, today's hearing occurs as our industry faces enormous economic difficulty. Dealer retail orders have virtually dried up, despite enormous incentives. Massive production cuts have occurred in the first quarter of this year. Up to one-third of the hourly work force was on lay-off in January. And the Big Three lost over $2 billion in the fourth quarter of last year.

We share the concerns driving considerations of S. 341: improving our energy security and maintaining our national security and economic health. The bill wisely addresses energy security in a comprehensive manner, by covering a wide range of issues concerning the supply and demand for energy.

We also appreciate the thought that went into constructing the CAFE provisions of the bill and the questions you raised. I will touch on some of these questions now, and be glad to submit others for the record.

GM's commitment to improving fuel efficiency has been significant over the years and continues to be so. Since 1979 we have invested over $75 billion in plants and equipment to build new, fuel-efficient cars and trucks. This year we introduced the Saturn family of fuel-efficient subcompacts and compacts. Later this year we will also introduce redesigned models of our best-selling line of compact cars. Our Geo Metro offers the highest fuel economy of any vehicle available in the U.S. And we have three multi-valve engine families, two electronic transmissions—more than any other domestic manufacturer.

Looking forward, we are also working on vehicles that would operate on fuels other than gasoline. By mid-year, we plan to begin selling, in limited numbers, trucks powered by natural gas. And we recently signed an agreement with the Gas Research Institute to begin engineering and product development of light and medium-duty trucks, optimized to run on natural gas.

We are also committed to producing the impact electric car. We currently chair the U.S. Advanced Battery Consortium. And in addition, we have got aggressive research and development programs in alcohol fuels, two-stroke engines, gasoline-turbine engines, and fuel cells.

In assessing the CAFE program, a central question is its effectiveness in conserving fuel. Some advocates attribute virtually all of the increase in new car fuel economy since the mid-1970's to the existence of this program. They say it has resulted in gasoline savings equivalent to 2.5 million barrels of oil per day, and that we would get additional savings of that magnitude if CAFE standards were raised further.

But these claims are based on the belief that the Federal Government can control gasoline consumption merely by regulating the fleet of vehicles supplied by manufacturers. It does not consider the essential role that the decisions made by millions of individual consumers play in determining both the company CAFE levels and total fuel consumption.

Several studies, for example, have concluded that the increase in fuel economy of the new car fleet, experienced prior the mid-1980's, can be accounted for largely by the effects of higher fuel prices on consumer behavior.

More recently, CAFE standards have been binding on full-line manufacturers like GM, and may have raised the fuel economy of the new car fleet somewhat, perhaps to 1 to 1.5 miles per gallon, according to one recent study.

But even this increase in new car fuel economy produced only small decreases in fuel consumption, less than 3-days worth over a 6-year period, according to that same study. The savings are small because CAFE regulation is working against powerful market signals, rather than with them.

For example, mandating higher fuel economy has the effect of encouraging those customers who purchase a more fuel-efficient vehicle to drive more because instead of setting increases in fuel prices, their per-mile cost of driving declines.

Turning now to the CAFE-related provisions of S. 341, we are encouraged by the thoughtful way the bill approaches the great difficulties in trying to set an appropriate CAFE level for the future. It begins to ask the right questions about the uncertainties and problems associated with attempting to set CAFE standards.

Attempting to mandate CAFE levels involves many critical and essentially unknowable assumptions about technology, about size and mix of vehicles, about the level of performance that consumers are going to expect, and about the impact of future emissions and safety regulations—and all of these relating not just to the present, but to the future as well.

The problems that arise in relying on command and control decisions to make these trade-offs illustrate why we continue to believe it would make sense to rely on policies that work with market forces.

At the same time, if higher CAFE standards are pursued, we believe it would be wise to rely on the rulemaking process, rather than legislative mandates for determining the appropriate levels. The reality is that significant increases in the CAFE standards, such as the extreme increases proposed in S. 279, the Bryan bill, will not be achievable without substantial changes in mix, size, or utility, which would threaten vehicle choice, threaten safety, and threaten jobs—both in our industry and in associated supplier and related industries—all for very little in the way of reductions in oil consumption.

A rulemaking process could allow for careful consideration of these and other factors. In that regard, the National Academy of Science's study on fuel economy technologies and economic practicability is an excellent first step.

In conclusion, we commend you for your efforts to wrestle with the difficult issues surrounding the CAFE program, and will do our best to answer the important questions that have been raised.

Thank you.

[The prepared statement of Ms. Whitman follows:]

PREPARED STATEMENT OF DR. MARINA v.N. WHITMAN, VICE PRESIDENT AND GROUP EXECUTIVE, GENERAL MOTORS CORP.

Thank you, Mr. Chairman. I am Marina Whitman, vice president and group executive in charge of the Public Affairs and Marketing Group of General Motors. We appreciate the opportunity to comment on the CAFE-related provisions of S. 341.

We share the concerns driving consideration of S. 341—improving our energy security and maintaining our national security and economic health. The bill wisely addresses energy security in a comprehensive manner by covering a wide-range of issues concerning the supply and demand for energy. We also appreciate the thought that went into constructing the CAFE provisions of the bill and the questions you raised. My statement will touch upon some of those questions. Others, however, require more careful analysis and I will be pleased to provide answers for the record.

General Motors' commitment to improving fuel economy has been significant over the years and continues to be so. Since 1979, we have invested over $75 billion in plants and equipment to build new, fuel efficient cars and trucks. This year, we introduced our Saturn family of fuel-efficient subcompact and compact cars and later this year we will introduce redesigned models of our best selling line of compact cars. Our Geo Metro offers the highest fuel economy of any vehicle available in the U.S. We have three multivalve engine families and two electronic transmissions, more than any other domestic manufacturer.

Looking forward, we are also working on vehicles that would operate on fuels other than gasoline. By mid-year, we plan to begin selling in limited numbers trucks powered by natural gas. We recently signed an agreement with the Gas Research Institute to begin engineering and product development of light- and medium-duty trucks optimized to run on natural gas. The objective is to offer regular production CNG-powered trucks by the mid-1990s. We are also committed to producing the Impact electric car, and we currently chair the U.S. Advanced Battery consortium that was recently announced. In addition, we have aggressive research and development programs in alcohol fuels, two-stroke engines, gasoline turbine engines and fuel cells.

In assessing the CAFE program, a central question is its effectiveness in conserving fuel. Some advocates attribute virtually all of the increases in new car fuel economy since the mid-1970's to the existence of the CAFE program. They say this program has resulted in gasoline savings equivalent to 2.5 million barrels of oil per day and that additional savings of that magnitude or more would result if the CAFE standards were raised further.

These claims, however, are based on the belief that the federal government can control gasoline consumption merely by regulating the fleet of vehicles supplied by manufacturers. Such a belief does not consider the essential role that the decisions made by millions of individual consumers play in determining both company CAFE levels and fuel consumption.

One should not underestimate this role that customer choice plays. Several studies, for example, have concluded that the increase in fuel economy of the new car fleet experienced prior to the mid-1980's can be accounted for largely by the effects of higher fuel prices on consumer behavior.

More recently, CAFE standards have been binding on full-line manufacturers like GM and may have raised the fuel economy of the new car fleet somewhat—perhaps by 1 to 1.5 miles per gallon, according to one recent study. But even this increase in new car fuel economy produced only small decreases in fuel consumption—less than three days worth over a six year period, according to the same study.

The savings are small because CAFE regulation is working against powerful market signals rather than with them. For example, mandating higher fuel economy has the effect of encouraging those customers who purchase a more fuel efficient vehicle to drive more because, absent offsetting increases in fuel prices, their per-mile cost of driving declines. Other aspects of the CAFE program have reduced and will continue to reduce its fuel savings potential even further.

Turning now to the CAFE-related provisions of S. 341, we are encouraged by the thoughtful way the bill approaches the great difficulties in trying to set an appropriate CAFE level for the future. It begins to ask the right questions about the uncertainties and problems associated with attempting to set CAFE standards. Attempting to mandate CAFE levels involves critical and essentially unknowable assumptions relating to such issues as current and future technology, the appropriate future size and mix of vehicles, the level of performance that consumers will expect from their vehicles and the impact of existing and future emissions and safety regulations. The problems that arise in relying on "command and control" decisions to make these trade-offs illustrate why we continue to believe it would make sense to rely on policies that work with market forces.

At the same time, if higher CAFE standards are pursued, we believe it would be wise to rely on the rulemaking process rather than legislative mandates for determining the appropriate levels. The reality is that significant increases in the CAFE standards, such as the extreme increases proposed in S. 279, will not be achievable without substantial changes in mix, size or utility. Such increases would limit the vehicle choices available to consumers, adversely affect highway safety and threaten the jobs of many people who work for manufacturers, their dealers and suppliers all for very little in the way of reductions in oil consumption. A rulemaking process could allow for careful consideration of these and other factors. In that regard, the National Academy of Sciences study on fuel economy technologies and economic practicability is an excellent first step.

In conclusion, we at General Motors share the commitment to energy conservation and the concerns about energy security that are the aims of this legislation. We continue to be committed to improving the energy efficiency of our products while working to provide the other values that consumers want when choosing a vehicle.

The issues this Committee is seeking to address and the questions you have raised are exceedingly complex and exceedingly important to all of us. We commend you for your efforts to wrestle with the difficult issues surrounding the CAFE program and we will do our best to answer the important questions that have been raised.

The **Chairman**. Thank you very much, Ms. Whitman.

Next, Mr. John Reilly.

STATEMENT OF JACK REILLY, CHAIRMAN, ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS

Mr. **Reilly**. Yes, Mr. Chairman.

Thank you, and I think it should be known that AIAM stands for the Association of International Automobile Manufacturers, which is a trade organization, representing 21 of the multinational corporations. And through the organization, plus the dealers, plus the port workers in the industry, we employ about 300,000 people.

I would like to footnote this by saying that in today's testimony, BMW and Porsche have already stated a disagreement with the percentage increase statement, which I am going to shortly give.

We would like to begin with some basic policy observations. First, we feel the bill represents the right way of approaching this subject of energy policy, namely, in a comprehensive manner.

Considerations of any changes to CAFE only make sense when it is kept in perspective by placing them in the broader sense of the overall energy policy.

Second, the committee should keep in mind that reducing energy consumption is a policy goal. Changing CAFE standards, ought not—in itself—to be the purpose of the exercise. And higher fuel-fleet economy averages are not synonymous with gallons of gasoline saved. For example, a larger vehicle carrying a group of passengers in a carpool, certainly can save more fuel than several small cars driven separately.

Third, America's dependence on foreign oil is not a function of the fuel economy of motor vehicles, or the particular level of CAFE standards. It has much more to do with the related cost of exploration and production of oil, and the market price of oil.

For example, as has been mentioned today, the average fleet-fuel economy more than doubled in the last 15 years. And today we import 47 percent of our oil, compared with only 35 percent in 1973.

AIAM firmly believes that a market-oriented approach to fuel economy is preferred to a command-and-control regulatory scheme. We have, for example, supported a broad-based carbon fee as being preferable to the fuel economy legislation which the Senate considered last year.

We have noted with great interest, but not with surprise, that the U.S. gasoline consumption decreased by almost 5 percent from last August to December, during the price increases that followed the beginning of the Kuwait situation. Price really does make a difference. Market-oriented incentives to conserve energy do work better, faster, and with less drag on the economy than regulatory schemes like higher CAFE standards.

Now, turning to S. 341, the National Energy Security Act of 1991, we would like to highlight just a couple of strengths, as well as its weakness. The bill will give knowledgeable people in the Department of Transportation responsibilities for determining the potential for new-car fuel efficiency. And this is a major contribution, we feel. Rather than proposing to write an arbitrary number into, the bill would establish a rational process for deciding what is both a very important and a very technical question. In this regard, AIAM is hopeful that the results of the National Academy of Sciences' CAFE study, which has already been commissioned by DOT, will provide a sound basis for assessing the vehicle technology piece of energy equation.

The list of criteria which must be considered by the Secretary in setting the standard should be the focus of the careful attention of Congress. Providing a list of the number of relevant factors to the decision setting a standard can only lead to a more rigorous and thorough consideration of what future CAFE levels can and ought to be.

Another very positive aspect of S. 341 is found in Section 11010 which provides for the trading of credits. This would inject greater marketplace mechanisms into the CAFE regime. Some have argued that a percentage-increase requirement is the only approach that would give high-mileage manufacturers an incentive to achieve even higher CAFE levels. And I feel that is untrue.

Tradable credits are another answer. They give each manufacturer an incentive to continue to improve its fleet fuel economy, beyond the level of the standards.

There are significant aspects of the bill which we feel need to be changed. Percentage increase, in our view, is bad public policy. For the first time, the Government would discriminate among companies in setting CAFE requirements. In the areas of automobile safety, emissions and fuel economy, the U.S. has always established one requirement for everyone to meet. Everyone is treated equally.

Punishing companies that have exceeded the current CAFE standards, we feel, sets a terrible precedent. To do so, unfortunately, would send a wrong message: do not perform better than the law requires, lest your good past performance be held against you in the future.

The percentage approach also perverts any credit system. For example, one company could have a CAFE average of, say, 38 miles per gallon, yet fall short of its CAFE target and be penalized. At the same time, another company could achieve 28 miles per gallon, and receive credits simply because it has a lower target. There is no logic, let alone fairness, in this approach.

Let me conclude, Mr. Chairman—because I know you are really pressed for time—by saying there are many aspects of S. 341 which merit comment. AIAM and its member companies have, or will submit, further information for the record. And we would certainly be able to answer whatever questions you may have.

[The prepared statement of Mr. Reilly follows:]

PREPARED STATEMENT OF JACK REILLY, CHAIRMAN, ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS

Mr. Chairman and Members of the Committee, my name is Jack Reilly. I am chairman of the Association of International Automobile Manufacturers ("AIAM"), a trade association that represents international manufacturers of passenger cars and trucks.* Our association represents 21 multinational companies which employ thousands of Americans in manufacturing, transportation, and distribution operations. The international automobile industry, including dealers, suppliers and port workers in the United States, provides jobs to more than 300,000 Americans.

We appreciate your invitation to participate in this hearing on S. 341 and to comment on the subject of Corporate Average Fuel Economy ("CAFE") standards.

Let me begin with some basic policy observations.

First, the bill represents the right way of approaching the subject of energy policy—namely, in a comprehensive manner. Consideration of any changes to CAFE only makes sense when kept in perspective by placing them in the broader context of overall energy policy.

Second, the Committee should keep in mind that reducing energy consumption is the policy goal. Changing CAFE standards ought not in itself be the purpose of the exercise, and higher fleet fuel economy averages are synonymous with gallons of gasoline saved. For example, a larger vehicle carrying a group of passengers in a car pool can save more fuel than several smaller cars driven separately.

Third, America's dependence on foreign oil is not a function of the fuel economy of motor vehicles or the particular levels of CAFE standards. It has much more to do with the relative cost of exploration and production of oil and the market price of oil. For example, the average fleet fuel economy more than doubled in the last fifteen years and yet today we import 47% of our oil compared to 35% in 1973.

AIAM firmly believes that a market-oriented approach to fuel economy is preferable to a command-and-control regulatory scheme. We have, for example, supported a broad-based carbon fee as being preferable to the fuel economy legislation which the Senate considered last year. We have noted with great interest, but not with surprise, that U.S. gasoline consumption decreased by almost 5% from August to December with the price increases following the invasion of Kuwait. Price really does make a difference. Market-oriented incentives to conserve energy do work better, faster, and with less drag on the economy than regulatory schemes like higher CAFE standards.

Turning to S. 341, the National Energy Security Act of 1991, we would like to highlight its strengths as well as its faults.

The bill would give knowledgeable people in the Department of Transportation responsibility for determining the potential for new car fuel efficiency. That is a major contribution. Rather than proposing to write an arbitrary number into the statute, the bill would establish a rational process for deciding what is both a very important and a very technical question. In this regard, AIAM is hopeful that the results of the National Academy of Sciences' CAFE study—which has already been commissioned by the Department of Transportation—will provide a sound basis for assessing the vehicle technology piece of the energy equation.

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* AIAM represents: American Honda Motor Company, Inc.; American Suzuki Motor Corporation; BMW of North America, Inc.; Daihatsu Motor Co., Ltd.; Fiat Auto U.S.A., Inc; Hyundai Motor America; Isuzu Motors of America, Inc.; Jaguar Cars, Inc.; Maserati Automobiles, Inc.; Mazda Motors of America, Inc.; Mitsubishi Motor America, Inc.; Nissan North America, Inc.; Peugeot Motors of America, Inc.; Porsche Cars North America, Inc.; Rolls-Royce Motor Cars, Inc.; Rover Group USA, Inc.; Saab-Scania of America, Inc.; Subaru of America, Inc.; Toyota Motor Sales U.S.A., Inc.; Volkswagen of America, Inc.; Volvo North America Corporation; and Yugo America, Inc. BMW and Porsche do not join in the portion of this statement dealing with percentage increase.

The list of criteria which must be considered by the Secretary in setting the standard should be the focus of the careful attention of Congress. Providing a list of a number of the relevant factors to the decision setting a standard can only lead to a more rigorous and thorough consideration of what future CAFE levels can and ought to be.

Another very positive aspect of S. 341 is found in Section 11010 which provides for the trading of credits. This would inject greater marketplace mechanisms into the CAFE regime. Some have argued that a percentage increase requirement is the only approach that would give high-mileage manufacturers an incentive to achieve even higher CAFE levels. That is untrue. Tradeable credits are another answer. Where there is a single standard for all manufacturers, they give each manufacturer an incentive to continue to improve its fleet fuel economy beyond the level of the standard.

There are significant aspects of this bill which need to be changed.

Percentage increase, in our view, is bad public policy. For the first time the government would discriminate among companies in setting CAFE requirements. In the areas of automobile safety, emissions and fuel economy, the U.S. has always established one requirement for everyone to meet. Everyone is treated equally.

Punishing companies that have exceeded the current CAFE standards sets a terrible precedent. To do so, undoubtedly, would send the wrong message: do not perform better than the law requires lest your good past performance be held against you in the future.

The percentage approach also perverts any credit system. For example, one company could have a CAFE of 38 mpg yet fall short of its CAFE target and be penalized. At the same time, another company could achieve 28 mpg and receive credits simply because it has a lower target. There is no logic, let alone fairness, in this approach.

The percentage approach is self-defeating. Because of its anti-competitive effects, there would be a shift in demand from vehicles sold by higher mileage companies to vehicles sold by lower mileage companies. As a consequence more vehicles subject to the less stringent standards would be sold and fewer vehicles subject to the more stringent standards would be sold. Whatever fuel savings were anticipated by the percentage approach would not materialize.

Another area where we disagree with S. 341 lies in Section 11015. We do appreciate the change from a civil penalty to an excessive fuel consumption fee. However, there is a very practical problem with the proposed increase in the amount. The increase is excessive and will encourage people who need large vehicles for their families or jobs simply to hold on to their old models as long as they can for cost reasons. This will not help fuel consumption, it will not meet consumer needs, and it will further depress the automotive sector of the economy.

We believe that S. 341 should be amended to retain the small manufacturer provision which exists in the current CAFE law (15 U.S.C. Sec. 2002(c)). Since the provision is available only to companies with worldwide production under 10,000 vehicles per year, it is truly a *de minimis* situation. Repealing the provision would disadvantage a few small specialized producers. Repeal would also create a barrier to entry into the market for potential new motor vehicle manufacturers.

CONCLUSION

There are many other aspects of S. 341 which merit comment. AIAM and its member companies have or will submit further information for the record.

The **Chairman**. Thank you very much, Mr. Reilly.

Dr. Lashof, do you believe that the Bryan bill could achieve—that you could achieve the miles per gallon savings of the Bryan bill with 1990's size and performance standards?

Dr. **Lashof**. I believe so. The analysis that is the basis for my testimony assume 1987 size and performance levels. There has been a slight change. But because that analysis showed you could do better than the Bryan bill—you could get 44 miles per gallon—then I believe you can.

The **Chairman**. Well, our legislation mandates DOT using those standards to come up with maximum miles per gallon savings. And if that is so, how can you say that our bill is only a slight improvement over the administration, which has no CAFE standards, when you can meet, under our legislation, what you say is possible—in fact, you must meet under our legislation what you say is possible.

Dr. LASHOF. Well, sir, as Mr. Plotkin testified earlier, it leaves a lot of room for judgment on the Department of Transportation, which we do not—which we are very concerned about, how they will use that discretion to set a standard.

In addition, specifically on the CAFE issue, the credit provisions, which would—if they would lift the cap on credits for alternative-fueled vehicles—would have the effect of substituting decaf for the real thing. Because, as Mr. Plotkin testified earlier, again, there is nothing to guarantee that vehicles would actually use alternative fuels.

The CHAIRMAN. We do not do that. That is the Administration bill.

My point is, I think it ill-serves our purpose, and the national interest, to automatically dump on our approach. This is a serious attempt to get the most miles-per-gallon saving that we can, consistent with whatever size and performance standards the Congress wants to adopt and the American people will put up with.

And to dump on our bill by saying it is only a slight improvement, I think it is just—ill serves our purpose here.

Look, we are not going to have a national energy plan, one that is comprehensive and that works, unless all sides give a little bit. And if you think the environmentalists are going to be able to get all of their—what did you call them—pet projects—and none of the others, you are wrong. And contrarywise, if the producer side thinks they are going to get all of theirs and not have some give on CAFE and on conservation, they are wrong.

What we are trying to do is forge a consensus of Americans, Americans all across this country—from the back woods to the corporate board rooms—want a national energy policy which will reduce consumption of oil and produce more domestically, and save more domestically. Now we can accomplish that if all sides will give a little bit, and be fair, and be cooperative in the effort.

And I think—I think that is what Americans what to do. And I want to urge—I know all of you come here with that spirit. And I want you to help us. Because we are serious about coming up with the best CAFE or VAFE or whatever we can find to produce the result.

We want to keep jobs—we very much listened to Mr. Bieber, and to the companies. We do not want to run our companies out of business. We want to be fair to Mr. Reilly's clients. But we want to do something that is achievable, and not some pie in the sky that cannot be done and that sacrifices American jobs in the process. And that is a very serious and difficult job. And I think the attitude that everyone has shown here today is going to be helpful in that.

I would like to ask that—we are going to be examining seriously the so-called VAFE. I would like to invite each of you to give in writing your response to that. It is not a very well filled out concept, except in general terms. So if you would favor it under some—with some changes, we would like to know what your changes are. I mean, it has been suggested, for example, that it be further enforced with carrots and sticks, in case there is movement within the size categories. I would like to get your views on that, and further views on anything else that has come up in the hearing today.

We are sorry we do not have time to go into more detail on questions and answers. We would like to very much, but as you can see, time has gotten us. We are going to have more hearings. And your point of view—each one of you will be well represented and well considered.

Senator Wallop.

Senator **Wallop**. Thank you, Mr. Chairman. Let me just say amen to what you say.

I have, Dr. Lashof, a less kindly view of the testimony which you delivered. I am not surprised, but I remain disappointed that NRDC would, through your statement, play with statistics; the comparison between what can be produced out of ANWR and saved out of CAFE are irrelevant to each other. Because both of them needs to be done if we are going to lessen our dependency on foreign-source oil.

I think you play with language, by talking about supporting a policy that "sacrifices" irreplaceable natural resources. I do not think that we have sacrificed to this moment in time—by anybody's estimate—Prudhoe Bay, or many of the other places out of which we have produced America's own resources.

And I think you play a little bit with lives—particularly those not only drive automobiles, but those who build them—to produce a result, quite frankly, that neither reduces dependency nor provides for American competitiveness, NRDC notwithstanding.

My view is that Americans will not accept your control over their lives, nor a reduction in their economic opportunities.

And so I join with the chairman who said it more kindly than that, that not—I counsel you not to play with language that is inflammatory on its face, and try to get some place. Because if you agree, as you said you did, that you can reach that standard of 40 miles per gallon using 1990 criteria, then it must be that you have to give a fairer consideration than you were prepared to bring here this morning to the provisions in S. 341.

I hope that in the future we have a little more give and a little more reason that comes out of the environmental community than that. Because I think Mr. Bieber's testimony was valid. I think Mr. Plotkin's testimony was valid. I think the effort of all the other people was to try to achieve the goal. And it strikes me, that what I see coming out of NRDC is not to achieve a goal, but to achieve control. And I think that is a disappointment, as we all try to get somewhere in this process.

Dr. **Lashof**. If I can just briefly respond?

We are prepared to be flexible and cooperative. And we are not saying that a policy to be supported has to contain any list of particular technologies that we are trying to support. In fact, what we want is a policy that is based on a least-cost principle, where the elements of that policy as a national energy strategy are based on analysis and a level playing field, between energy supply and energy efficiency resources. And that is—the failure of the National Energy Strategy to do that—despite testimony around the country, and our involvement that that should be its basis—is what disappoints us.

And the failure of S. 341 to do that is what makes it impossible for us to support it. And it is not just the CAFE provision, I should say.

Senator **Wallop**. Well, I suggest to you that you may well be left on the outside, while the more serious people try to do the comprehensive effort that Senator Johnston and I have embarked on and the administration at least feels that it has attempted to do, and has stated their willingness to work with us.

If you want to be a part of it—and I suggest you come along and not sit on the outside and heave grenades into the inside.

The **Chairman**. Well, I would not go as far as Senator Wallop, as far as to say that anyone here has been not serious. I just urge you all to be. And I know you will be. I mean, we need the help of all sides in this. I guess I am just a little disappointed not to receive a little more credit from NRDC.

We are trying to achieve something, put on the law books, things that NRDC has been trying to do for a long time. We do not want the issue, we want some action. And we hope this bill will give us that.

As a final, parting thing, I would like to say that committee staff questions, for the record—by Senators—should be submitted by the close of business today. The hearing record will be kept open for 2 weeks, for such supplemental as all of you would like to give us. And I want to thank this panel of witnesses. You have been excellent. We did not give you enough time, but you have been an excellent panel.

Thank you very much.

[Whereupon, at 1:06 p.m., the hearing was adjourned.]

[The following statements were submitted for the record on February 28, 1991:]

PREPARED STATEMENT OF VOLKSWAGEN OF AMERICA, INC.

Volkswagen of America, Inc. (VWoA), the authorized importer of Volkswagen and Audi automobiles, with headquarters in Troy, Michigan, respectfully submits the following comment for the record on S. 341, the National Energy Security Act of 1991. We request that this statement be included in the hearing record on S. 341.

SUMMARY

VWoA commends Senators Johnston and Wallop for introducing automobile fuel economy legislation that takes into account several factors that have been sorely missing from certain other CAFE bills under consideration. Specifically, these factors: (a) include a Department of Transportation evaluation of the maximum feasible fuel economy increases based on economic practicability; and (b) recognize the importance of maintaining vehicle size and performance levels compatible with the desires of the car-buying public.

(1) There is one particular component of the CAFE program proposed in S. 341 that we cannot support, and that is the "percent increase" concept which would set different standards for different manufacturers. This concept would disadvantage VWoA, a multi-line car company, in the marketplace.

(2) Volkswagen and Audi vehicles already incorporate all of the technology cited by the Office of Technology Assessment (OTA) to improve fuel economy. Therefore, there is little opportunity to raise the VWoA CAFE level with these measures. The degree to which different manufacturers have applied fuel-saving technology needs to be accounted for in the difficult quest for equitable CAFE standards.

(3) The role of consumer demand in the marketplace is of enormous importance, as recognized by the criteria factors in S. 341 noted above. The VWoA experience in

the early 1980s is a classic example of this role. When fuel prices and availability were out of line in this period, the VWoA CAFE rose more than six mpg, only to drop the same amount when fuel prices returned to normal.

(4) VWoA supports the removal of the CAFE credit cap associated with the sale of dual-fuel vehicles. Repealing this cap would encourage increased sales of Volkswagen models capable of operating on methanol, with an expected attendant increase in the availability of methanol-based fuel.

(5) Consideration of changes in the CAFE law should not overlook the possible impact of a United States-Mexico Free Trade Agreement on the definition of "domestic" and "import" categories of manufacturers. We recommend that the proposed United States-Mexico Free Trade Agreement have a neutral impact on a manufacturer's competitive position vis-a-vis CAFE. This could be accomplished by giving a manufacturer the choice of determining whether Mexican-produced vehicles were to be included in its "domestic' or "import" fleet for CAFE purposes.

1. The "Percent Increase" Concept To Set Different Standards for Different Manufacturers Is Not Equitable

The concept of manufacturer-specific "percent increase" fuel economy standards is a punitive measure that would disadvantage VWoA in the marketplace.

Even if the percent increases derived from a DOT-sponsored analysis were to be extremely modest, and even if the base model year chosen were to bring the majority of manufacturers close to the same starting point, the "percent increase" concept is inherently flawed. With such a concept imbedded in a new CAFE law, there is great risk that high percent increase levels or widely varying base model year CAFEs adopted at some future time would result in market manipulation, with disadvantages to those forced to meet higher standards.

The U.S. domestic car manufacturers have made significant gains in improving their CAFE levels over the past fifteen years. To now adopt a concept that would place a more demanding standard on VWoA than on other manufacturers is out of place in the U.S. legislative process. This discrimination would be especially unwarranted for Volkswagen, a name synonymous with fuel-conscious cars for American buyers since the 1950s.

Recently, some alternative CAFE concepts have been proposed which would be based on size classes or market segmentation. VWoA's initial analysis of these alternatives shows that they could reduce the flexibility in market mix offerings by a manufacturer, compared to the existing CAFE law which sets a single standard for all manufacturers. Perhaps these alternatives can be developed sufficiently to overcome this reduced flexibility, but until such time as this occurs VWoA remains highly skeptical of these approaches.

2. The Technology To Achieve Significant CAFE Increases Is Not Available For VWoA's Products

Much of the debate surrounding legislation to increase manufacturers' CAFE centers on whether or not technology is available to make additional significant fuel economy gains. The debate is narrowed even further by proponents who maintain that significant gains can still be made without further size and weight reduction (downsizing).

The basic menu of technological measures purported to be available to manufacturers for fuel economy gains was developed by the Office of Technology Assessment (OTA) in 1988 and has been refined over the years. Few would dispute that adoption of technology measures listed by OTA would result in fuel economy improvement.

For Volkswagen and Audi, the technology measures on the OTA menu are not available inasmuch as they have already been adopted, some features as long ago as 1969. Consequently, a significant fuel economy gain based on applying the OTA technology list is out of the question for Volkswagen and Audi models. Let us review these technology measures and their application to the VWoA passenger car product line:

Front Wheel Drive

Front wheel drive is the technology cited by OTA that gives the highest single fuel economy gain (10 percent), yet that option is not available because all Volkswagen and Audi models already have front wheel drive, and have had since 1981. Many Volkswagen and Audi models incorporated front wheel drive long before 1981, going back to 1969 when Audi cars were introduced into the U.S.

Reduced Aerodynamic Drag

All Volkswagen and Audi models have Cds at or below 0.36, except for two older models. Volkswagen's newest model, the Passat, has a Cd of 0.31, among the lowest of any production car. Volkswagen AG was one of the first manufacturers to have its own full-scale wind tunnel, in operation before the first energy crisis in 1975, which is used as an integral part of the design process to minimize aerodynamic drag.

Four-speed Automatic Transmission/Lock-up Torque Converters

Fifty percent of the Volkswagen and Audi models with automatic transmissions are of the four-speed type with lock-up torque converter feature.

Five-speed Manual Transmissions

All Volkswagen and Audi models with manual transmissions are of the five-speed type, except for one entry level model. Five-speed manual transmissions have been available within the VWoA product line since 1980.

Overhead Cam Valve Operation

All Volkswagen and Audi models have, and have had since 1981, engines with overhead cam valve operation. The VW Rabbit, and its successor, the VW Golf, have had overhead cam engines since 1975.

Multi-point Fuel Injection

All Volkswagen and Audi models have, and have had since the late 1970s, engines with multi-point fuel injection. VWoA was the first company to offer multi-point fuel injection in widespread production, beginning in 1968.

Four-valve Cylinder Engines

Four-valve per cylinder engines are principally high-rpm power enhancers, rather than fuel economy improvers, and are offered in the higher-performance Volkswagen and Audi models. The theory that a two-valve per cylinder engine of certain displacement can be replaced by a four-valve per cylinder engine of lesser displacement is in itself misleading; low-rpm torque characteristics are more important for comparing the fuel economy of engines rather than maximum horsepower characteristics.

3. The Role Of Consumer Demand For Fuel Efficient Cars Is A Key Element

It has been VWoA's experience in the U.S. market that when there is consumer demand for more fuel efficient vehicles, our CAFE has increased remarkedly. Our experience also shows that the opposite is true as well.

Figure 1 is a plot of VWoA's CAFE over the years since 1975. The CAFE standards are also plotted for reference. This figure clearly shows the effect that consumer demand for high mileage cars—caused by the energy crunch in 1979-1981—had on the VWoA CAFE level. From 28.6 mpg in 1979, the VWoA CAFE jumped to 35.2 mpg in 1981. The figure also clearly shows the drop in CAFE, to 29.1 mpg in 1984, when consumer demand for fuel efficient cars waned after the energy crunch. This is clear evidence that market demands affect CAFE levels. If CAFE is to be dramatically increased, the way to do this is through fuel pricing, for example, rather than legislative mandate.

It is important to note that in VWoA's case, CAFE increased during the energy crunch because consumers were willing to trade off performance and comfort attributes for higher fuel economy. During this period, for example, buyers snapped up Volkswagen diesel cars to achieve high mileage at the expense of acceleration performance and comfort level.

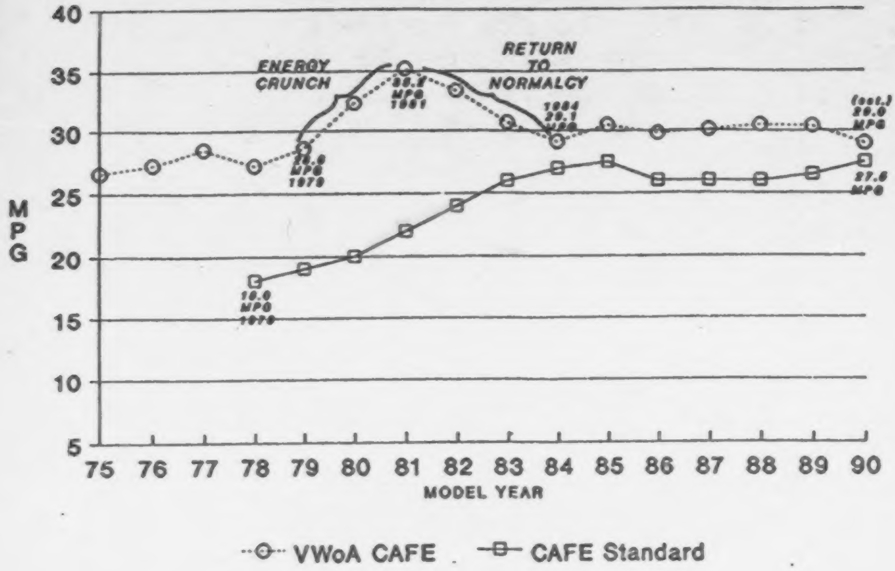
Legislation that attempts to reduce vehicular fuel consumption and increase manufacturers' CAFE levels should recognize the importance of bringing market forces into play to achieve the desired results. VWoA supports the attempt to incorporate consumer demand into CAFE legislation as evidenced in S. 341.

4. The CAFE Credit Cap That Would Restrict The Sale Of Dual-Fuel Vehicles Should Be Removed

The CAFE credit cap affecting the sale of dual-fuel vehicles in Section 513(g) of the Motor Vehicle and Cost Savings Act should be removed, or at least increased. Volkswagen is a major participant in programs to encourage the acceptance of alternative-fueled vehicles. The Volkswagen Jetta Multi-Fuel model has been introduced in California and New York as part of special local programs to build up methanol-fueled evaluation fleets.

VWoA believes that removing the CAFE credit cap would encourage increased sales of VW models capable of operating on methanol. The availability of more of these vehicles from major manufacturers would be a positive influence on increased access to methanol-based fuels.

VWoA CAFE 1975-1990 Figure 1.



5. A United States-Mexico Free Trade Agreement Should Not Adversely Affect A Manufacturer's CAFE Category

The current CAFE statute establishes and defines two categories for passenger automobiles, relating to whether an automobile is domestically manufactured or imported (15 U.S.C. 2003 [b]). This provision of the statute also stipulates that automobiles manufactured in Canada effectively be treated the same as those manufactured in the U.S. for the category of domestically-manufactured automobiles.

One of the issues that could arise in any negotiations on a U.S.-Mexico Free Trade Agreement (FTA) is the CAFE treatment of automobiles produced in Mexico and imported to the U.S. Several possible scenarios can be envisioned for this treatment, bearing in mind the precedent already set by the CAFE law provision affecting certain automobiles produced in Canada, coupled with the initiative to expand any U.S.-Mexico FTA to include Canada.

VWoA believes that any U.S.-Mexico FTA provisions affecting a manufacturer's CAFE category status should be crafted so as not to competitively disadvantage that manufacturer's current position in the marketplace. In other words, any U.S.-Mexico FTA should be neutral in its influence on the CAFE statute. This could be accomplished by giving a manufacturer the choice of determining whether Mexican-produced vehicles were to be included in its "domestic" or "import" fleet for CAFE purposes.

CONCLUSION

VWoA appreciates the opportunity to offer comments on S. 341. Thank you for considering our views.

Statement on S.341, the National Energy Security Act of 1991, Submitted to the Senate Committee on Energy and Natural Resources

February 28, 1991

INSURANCE INSTITUTE FOR HIGHWAY SAFETY

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The Insurance Institute for Highway Safety is a nonprofit research and communications organization, supported by the nation's property and casualty insurers, that identifies ways to reduce motor vehicle crashes and crash losses. At this Committee's request, the Institute is providing research results on the relationship between vehicle safety and fuel economy standards. Also as requested, the Institute is addressing questions from the Committee about the safety consequences of proposed fuel economy standards and providing information about several safety issues that have been raised during the current fuel economy debate.

Institute research shows very clearly that downsizing cars has negative safety consequences. If fuel economy standards are set at a level that forces auto manufacturers to make cars smaller, the occupants of such cars would be exposed to greater risk of death or injury on our nation's highways. The current debate should focus on reasonable fuel economy improvements that can be achieved without reducing vehicle size.

Any legislation addressing fuel economy should require the Secretary of Transportation to analyze the safety consequences including downsizing, changing the vehicle mix, etc. Such analyses should also address the adverse safety effects that could follow from automakers using new engine technologies to increase vehicle performance rather than to increase fuel efficiency.

Response to question 6(a), which asks respondents to comment on the safety assumption in proposed section 502(e)(2)(E).

Section 502(e)(2)(E) of the National Energy Security Act of 1991 provides that, in determining the maximum feasible average fuel economy, the Secretary of Transportation must assume that vehicles will meet "all applicable automobile safety standards." This provision is related to the requirement that the Secretary must consider the "effect of other Federal motor vehicle standards on fuel economy" (section 502 (e)(1)(C)).

These two provisions are far too narrow. They require the Secretary only to consider the specific added vehicle weights associated with specific federal motor vehicle safety standards – fine as far as it goes, but it does not go far enough. The Secretary should look beyond this to assess the overall safety effects tougher fuel economy standards might have. In particular, the Secretary should consider whether the standards would result in either downsized cars or more small cars being sold in order to comply with the tougher standards. By requiring a safety impact analysis, Congress would ensure that safety is not overlooked in the fuel economy decisionmaking process.

Response to question 6(b): Are smaller automobiles less safe than larger automobiles? Why or why not? Have studies of this question adequately controlled for other correlating factors affecting safety?

Studies by the U.S. Department of Transportation, the Insurance Institute for Highway Safety, and other safety research organizations have consistently found that car size is perhaps the most important single factor when it comes to protecting occupants in crashes. All other things being equal, people in larger cars sustain fewer injuries in crashes than people in smaller cars. This occurs because smaller cars have less crush space outside the occupant compartment to absorb energy and, therefore, higher crash forces are transmitted to their occupants. Less crush space also means the occupant compartments of smaller cars are more vulnerable to intrusion in crashes than are the compartments of larger cars. When occupant compartments are intruded, the likelihood of serious injury increases dramatically regardless of the restraint system.

Overall, the death rate in the smallest cars on the road is more than double the rate in the largest cars. For every 10,000 registered cars 1-3 years old in 1989, 3.0 deaths occurred in the smallest cars, compared with 1.3 in the largest cars. The death rate is at least twice as high in small cars, compared with large cars, in both single- and multiple-vehicle crashes. These effects of car size hold regardless of driver age.

The Institute has examined in detail the safety effects of vehicle downsizing. Institute researchers have looked at occupant death rates for 11 General Motors car types that were downsized during the late 1970s and '80s, finding occupant death rates higher for 10 of the 11 types after downsizing. The rate for the eleventh type remained the same (see Status Report, Vol. 25, No. 8, attached). The number of deaths per 10,000 registered Chevrolet Camaros and Firebirds, for example, jumped 43 percent from before to after downsizing in 1982. Deaths per 10,000 registered Buick LeSabres and Oldsmobile Delta 88s increased 27 percent after downsizing in 1986. What is clear from these and other comparisons is that downsized models have more occupant deaths per registered car than their larger counterpart models.

At February 1991 hearings before the Consumer Subcommittee of the Senate Committee on Commerce, Science, and Transportation, Marc Ledbetter of the American Council for An Energy Efficient Economy challenged the Institute's conclusions about occupant death rates before and after downsizing. He noted that downsized cars are newer than their larger predecessor models and that, on average, newer cars travel more miles than older ones. The Institute has completed additional analyses to clarify these results and found offsetting effects. Newer cars do travel more miles, on average, than older ones, and so there is greater exposure to crash involvement in newer cars. As cars age, the risk of being in a crash decreases. On the other hand, safety belt use is higher in new cars than it is in older cars. This means lower risk of crash death or injury in newer cars, compared with older ones.

No reliable data are available to adjust for these offsetting effects. Besides, it is not necessary to do so. Occupant death rates for General Motors cars that were not downsized provide ideal comparison groups for those that were downsized because, in each group, vehicle age-related effects should have the same influence. Institute researchers have computed death rates for comparison (i.e., not downsized) General Motors car types and found that, in five out of eight cases, such rates did not change or they actually decreased (see attached table, "Deaths Per 10,000 Registered Cars in Calendar Years 1985-89, GM Models Before and After Downsizing"). In the three cases where death rates did increase for newer but unchanged (i.e., not downsized) cars, the increases were smaller than those for the downsized cars. Such results confirm the Institute's earlier finding that downsizing leads to increased occupant death rates.

Another way to understand the impact of downsizing on car safety is to compare the occupant death rate for a recent model year with the rate that would have been expected in the absence of downsizing. Institute researchers have calculated both the actual occupant death rate for 1988 model year cars in 1989 and the rate that would have been expected if the mix of '88 cars by size had been the same as in the 1975 model year. The actual occupant death rate was 2.2 per 10,000 registered 1-year-old passenger cars in 1989. However, if we had more large cars and fewer small ones -- as we did in the 1975 model year, before downsizing -- the death rate for the '88 models would have been much lower, 1.8 per 10,000 instead of 2.2. This means there were about 425 extra deaths in 1988 models during 1989, simply because the cars were smaller, on average, than the 1975 models. These are excess deaths in only one model year of cars during one calendar year. Additional deaths will occur each year in the 1988 models, as well as in other downsized cars, for as long as these cars are on the road.

Car Size	PASSENGER CAR SIZE DISTRIBUTION		Occupant Deaths Per 10,000
(Wheelbase in inches)	1975 Models Registered in Calendar Year 1976	1988 Models Registered in Calendar Year 1989	Registered 1988 Model Cars During Calendar Year 1989
<95 in.	6%	13%	3.4
95-99 in.	19%	19%	2.5
100-04 in.	3%	36%	2.1
105-09 in.	6%	18%	1.6
110-14 in.	23%	10%	1.8
>114 in.	42%	4%	1.2

OVERALL OCCUPANT DEATH RATE FOR 1988 MODELS IN '89 = 2.2

EXPECTED DEATH RATE GIVEN 1975 MODEL YEAR SIZE MIX = 1.8

Response to question 6(c): Are higher-performance automobiles less safe than lower-performance automobiles? Why or why not? Have studies of this question adequately controlled for other correlating factors affecting safety?

A study by the Insurance Institute for Highway Safety computed deaths per 10,000 registered 1985-87 cars during 1986-88 and found that, among the 103 biggest-selling vehicle series, the rates varied by more than 700 percent (see Status Report, Vol. 24, No. 11, attached). The influence of car size is clear -- 12 of the 15 cars with the highest death rates were small, the other three were midsize, and none were large.

Equally clear are the effects of vehicle performance on death rates -- several high-performance cars had especially poor fatality rates. In fact, the automobile series with the highest death rate per 10,000 registered cars was the Chevrolet Corvette, a small high-performance car. Other such cars including the Nissan 300ZX, Chevrolet Camaro, and Pontiac Firebird also were among those with highest death rates.

Because death rates are influenced by vehicle size and the age and sex of drivers, Institute researchers computed for each of the 103 cars series a predicted as well as an actual death rate. The predicted rate is the one that would be expected based on the size of the car and the age and sex of the driver. What researchers found were several high-performance cars with actual death rates far worse than their predicted rates. For example, the Corvette's rate was 44 percent worse than predicted. It is reasonable to assume that some of this increased risk is due to the car's performance characteristics.

The Institute is concerned that many automakers have implemented engine technology improvements largely to boost performance instead of to improve fuel economy. This is particularly unfortunate because high performance works against both fuel economy and safety. Automakers should not only stop building cars with excessively high performance but also promoting performance in ways that encourage excessive speeding.

Speed promotion has been blatant in recent years. For example, according to an article in Automotive News, "...hot rodding is back at Pontiac. Firebird customers with the 225-horsepower 5.0 liter V-8 or the 240-horsepower 5.7 liter V-8 engines will be able to ask dealers to increase performance with the Street Legal Performance package" that adds extra horsepower. Advertisements such as the one attached for Toyota, which extols the 0-60 mph capability of its MR2 Turbo sports car, are proliferating, too.

While Congress is working to try to find ways to save fuel and decrease our dependence on foreign oil, automakers are working against the same goal by marketing high-performance options that use more fuel and compromise safety by increasing acceleration and top speed capabilities. Cars from Detroit, Europe, and Japan with very fast 0-60 mph acceleration times and very high top speeds have nothing to do with everyday driving. Now is the time to change auto design and marketing practices to enhance both safety and fuel conservation. Now is the time, for example, to consider controls on the acceleration and top speed capabilities of passenger cars. Current technology allows for top speed controls at, say, 70 mph while allowing adequate acceleration for normal driving as well as reserve acceleration for rare emergencies. Rethinking auto design in ways like this could serve both safety and fuel conservation.

Response to question 6(d): Do safety standards provide for an adequate level of safety regardless of the size of the automobile? Compare the effect on safety of vehicle size to the effects of other variables such as age, performance level of automobiles, intoxication, conformity to speed limits, etc.

Federal motor vehicle safety standards have the important effect of setting minimum levels of safety performance that vehicles sold in the United States must meet. Complying with these standards does not, however, overcome the laws of physics that dictate the safety disadvantage of small vehicle size.

In multiple-vehicle crashes, the disadvantages to the occupants of smaller cars are obvious and, in fact, are dictated by the laws of physics. But it is not only in multiple-vehicle crashes that occupants of small cars face greater risks. Even in single-vehicle crashes, which accounted for 44 percent of all passenger car occupant deaths in 1989, the occupant death rate in the smallest cars was 1.2 per 10,000 registered 1-3 year old cars in 1989, compared with 0.5 per 10,000 in the largest cars.

For the next several model years, the relative safety disadvantage to occupants of small cars will get worse. This is because mostly large and midsize cars, not small ones, will be equipped with advanced safety features like air bags.

Response to question 6(e): As a matter of national policy, should Congress contemplate changes in CAFE law that trade off smaller size for greater fuel savings? Assume, for purposes of this question, that size is related to safety.

The Insurance Institute for Highway Safety understands the importance of conserving fuel not only to lessen our dependence on unstable foreign oil sources but also to protect the environment. We support all sensible steps to conserve fuel, including improved fuel economy, that do not result in smaller cars. At the same time, safety must be a factor in fuel economy and environmental decisions that involve automobiles, and the research data are clear and convincing on this point -- smaller cars have higher death rates than larger cars. Congress should not enact fuel economy requirements that would lead to smaller, less safe cars.

The Research Safety Vehicle (RSV)

One issue that is not being correctly addressed in the current fuel economy debate involves occupant safety in the federal government's RSV program. Of specific concern is the performance of the Minicars RSV.

Contrary to a number of claims, the Minicars RSV is not particularly fuel efficient. Its fuel economy rating that would be used in corporate average fuel economy calculations is 33 miles per gallon. Furthermore, the Minicars RSV is not a family-size vehicle. It does have an outer body comparable in size to that of the Chrysler New Yorker, but the interior is little bigger than a sports car. Its seating capacity is basically 2+2, and the rear seat is not big enough to accommodate a child safety seat.

The RSV does demonstrate some important safety concepts including air bag protection in high-speed frontal crashes. But there are tradeoffs. Its side impact protection, for example, includes features such as thick foam-filled gullwing doors with windows that cannot be rolled down and a very high side floor sill. These features are not likely to be acceptable in cars sold to the general public. Handling characteristics of the RSV are also poor and, in fact, were rated as unsafe when it was tested in Germany in 1980.

Fuel Economy Standards and Vehicle Death Rate per Miles Traveled

During the current fuel economy debate, some people continue to point to the per-mile motor vehicle death rate, saying that because this rate is lower than it has ever been present fuel economy standards could not have imposed adverse safety effects. This is a specious claim, however, because the overall motor vehicle death rate is too general a statistic to gauge anything as specific as the impact of car downsizing. Many factors have contributed to an overall improvement in the highway safety picture since fuel economy standards were introduced and cars were downsized. Most states have enacted safety belt use laws, for example, and more people are buckling up. We, as a society, are taking alcohol-impaired driving more seriously than we used to. This major problem has been addressed with tougher laws and enforcement programs. Plus, baby boomers have grown up, so there are fewer young, high-risk drivers on our streets and highways. These and other changes more than offset the negatives associated with smaller cars, which is why the per-mile death rate is going down.

Another, very specific reason this rate is going down is that it includes all kinds of deaths -- motorcyclist, bicyclist, pedestrian, and other categories of deaths that have nothing to do with car size. The decline in the mileage death rate during recent years is largely due to declines in these other deaths, particularly motorcyclist deaths, which are down 25 percent since 1983.

What Fuel Economy Improvement can be Achieved without Reducing Car Size? Automotive engineers at the Insurance Institute for Highway Safety are in the process of examining the 1990 passenger car fleet to determine what fuel economy improvements can be made without having to reduce vehicle size. In doing so, the 1990 fleet will be arranged into size categories based on wheelbase.

Why wheelbase instead of interior volume, which is reported to the Environmental Protection Agency? Because it is the exterior dimensions of cars, rather than their interior volumes, that are relevant to safety. Exterior size is what determines whether there is sufficient crush zone to protect occupants in crashes. It is possible for a vehicle to have substantial interior volume but very limited exterior dimensions. Such a car would have little structure to absorb crash force before it causes occupant compartment intrusion.

Results of the Institute's analyses of potential improvement in fuel economy for the 1990 fleet will be submitted to the Committee when they are complete.

STATUS INSURANCE INSTITUTE FOR HIGHWAY SAFETY REPORT
Vol. 25, No. 8 September 8, 1990

Where Is Safety in the Fuel Economy Debate?

The Energy Policy and Conservation Act of 1975 required passenger car manufacturers to achieve fleet-average fuel economy of 27.5 mpg by the 1985 model year. In response to this requirement as well as consumer demand, automakers succeeded in nearly doubling average fuel economy between the mid-1970s and 1984.

Now that American and other troops are defending Middle East oil fields, national attention is being refocused on oil conservation. Saving fuel would not only lessen our need for foreign oil but also cut the carbon dioxide emissions that contribute to global warming. One longterm conservation plan now before Congress could raise average fuel economy to 40 mpg by 2001.

Some proponents of tougher fuel economy standards say they're practical to achieve using existing technology without shifting to much smaller cars. Automakers say substantial new fuel economy gains will be hard to come by and definitely will require another round of downsizing.

Largely missing from this debate is safety. Downsizing cars has negative safety consequences. This is not to say fuel economy standards should be abandoned. It is to say their potential to increase crash deaths and injuries should be considered in the debate.

Congress Looking at Fuel Economy Changes

Automobiles on U.S. roads are much more fuel efficient now than 15 years ago but improvements aren't continuing apace. The fuel economy of the U.S. fleet decreased 4 percent from 1988 to 1990, due in great part to a 6 percent overall gain in car weight and a 20 percent increase in average engine horsepower.

To spur renewed emphasis on fuel economy in the long run — federal standards cannot alleviate immediate gasoline shortages — Senator Richard H. Bryan of Nevada introduced the Motor Vehicle Fuel Efficiency Act in 1989. This legislation would require each automaker to achieve a 20 percent increase in the fuel economy of its passenger cars by the 1995 model year — 40 percent by 2001 — compared with 1988. If these improvements are realized, the U.S. fleet would be getting an

(Cont'd on p. 3)

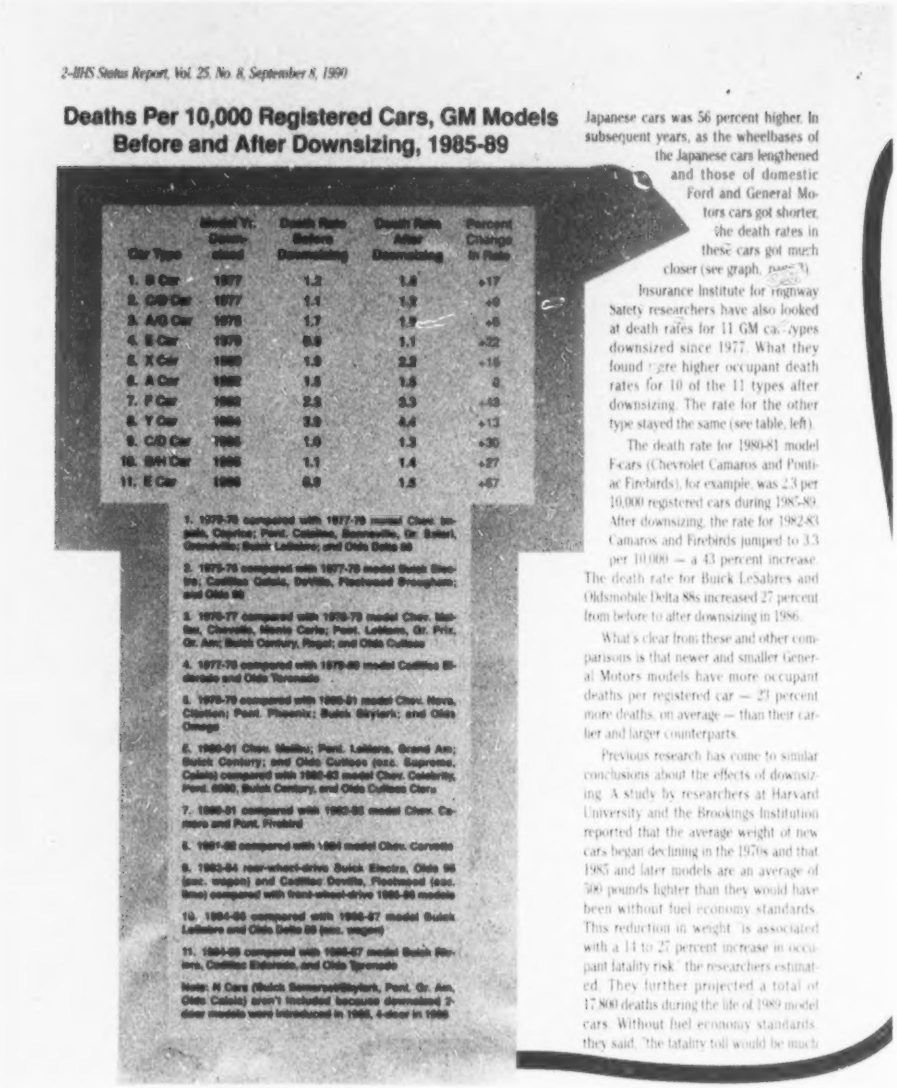
Downsizing Cars Means More Deaths

Fuel economy standards create safety problems if they force automakers to make cars smaller in order to increase the average miles per gallon of their fleets.

Ford and General Motors were building mostly large and midsize cars before fuel economy standards were implemented in the 1970s. They are the two largest automakers that have since downsized their cars. Chrysler has stopped making large cars altogether. Meanwhile, many Japanese cars have actually increased in size.

The effects of these changes on safety have been dramatic. In the 1978 model year, the average wheelbase of Toyotas and Nissans was 15 inches shorter than the wheelbases of domestic Ford and GM cars — and the occupant death rate in [illegible]

SPECIAL ISSUE: FUEL ECONOMY, SAFETY



Deaths Per 10,000 Registered Cars, GM Models Before and After Downsizing, 1985-89

Car Type	Model Yr. Downsized	Death Rate Before Downsizing	Death Rate After Downsizing	Percent Change in Rate
1. B Car	1977	1.2	1.4	+17
2. C/D Car	1977	1.1	1.2	+9
3. A/G Car	1978	1.7	1.8	+6
4. E Car	1979	0.9	1.1	+22
5. X Car	1980	1.9	2.2	+16
6. A Car	1982	1.5	1.5	0
7. F Car	1982	2.3	3.3	+43
8. Y Car	1984	3.9	4.4	+13
9. C/D Car	1985	1.0	1.3	+30
10. B/H Car	1986	1.1	1.4	+27
11. E Car	1986	0.9	1.5	+67

1. 1975-76 compared with 1977-78 model Chev. Impala, Caprice; Pont. Catalina, Bonneville, Gr. Safari, Grandville; Buick LeSabre; and Olds Delta 88

2. 1975-76 compared with 1977-78 model Buick Electra; Cadillac Calais, DeVille, Fleetwood Brougham; and Olds 98

3. 1976-77 compared with 1978-79 model Chev. Malibu, Chevelle, Monte Carlo; Pont. LeMans, Gr. Prix, Gr. Am; Buick Century, Regal; and Olds Cutlass

4. 1977-78 compared with 1979-80 model Cadillac Eldorado and Olds Toronado

5. 1978-79 compared with 1980-81 model Chev. Nova, Citation; Pont. Phoenix; Buick Skylark; and Olds Omega

6. 1980-81 Chev. Malibu; Pont. LeMans, Grand Am; Buick Century; and Olds Cutlass (exc. Supreme, Calais) compared with 1982-83 model Chev. Celebrity, Pont. 6000, Buick Century, and Olds Cutlass Ciera

7. 1980-81 compared with 1982-83 model Chev. Camaro and Pont. Firebird

8. 1981-82 compared with 1984 model Chev. Corvette

9. 1983-84 rear-wheel-drive Buick Electra, Olds 98 (exc. wagon) and Cadillac DeVille, Fleetwood (exc. limo) compared with front-wheel-drive 1985-86 models

10. 1984-85 compared with 1986-87 model Buick LeSabre and Olds Delta 88 (exc. wagon)

11. 1984-85 compared with 1986-87 model Buick Riviera, Cadillac Eldorado, and Olds Toronado

Note: N Cars (Buick Somerset/Skylark, Pont. Gr. Am, Olds Calais) aren't included because downsized 2-door models were introduced in 1985, 4-door in 1986

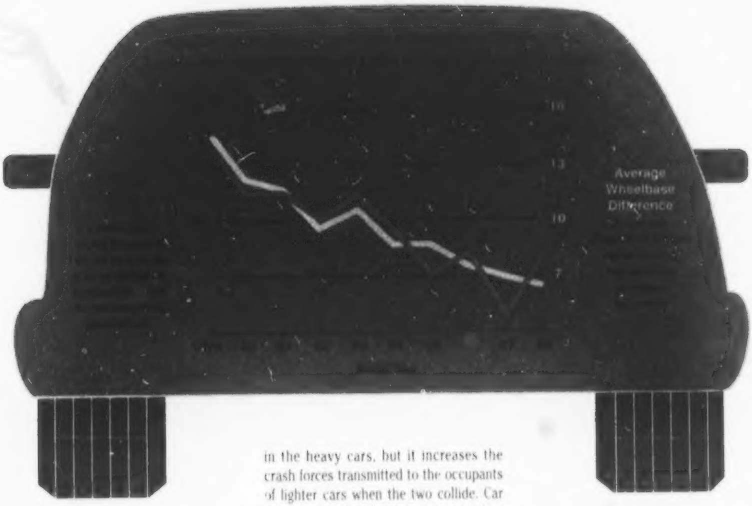
Japanese cars was 56 percent higher. In subsequent years, as the wheelbases of the Japanese cars lengthened and those of domestic Ford and General Motors cars got shorter, the death rates in these cars got much closer (see graph, page 3).

Insurance Institute for Highway Safety researchers have also looked at death rates for 11 GM car types downsized since 1977. What they found were higher occupant death rates for 10 of the 11 types after downsizing. The rate for the other type stayed the same (see table, left).

The death rate for 1980-81 model F-cars (Chevrolet Camaros and Pontiac Firebirds), for example, was 2.3 per 10,000 registered cars during 1985-89. After downsizing, the rate for 1982-83 Camaros and Firebirds jumped to 3.3 per 10,000 — a 43 percent increase. The death rate for Buick LeSabres and Oldsmobile Delta 88s increased 27 percent from before to after downsizing in 1986.

What's clear from these and other comparisons is that newer and smaller General Motors models have more occupant deaths per registered car — 23 percent more deaths, on average — than their earlier and larger counterparts.

Previous research has come to similar conclusions about the effects of downsizing. A study by researchers at Harvard University and the Brookings Institution reported that the average weight of new cars began declining in the 1970s and that 1985 and later models are an average of 500 pounds lighter than they would have been without fuel economy standards. This reduction in weight "is associated with a 14 to 27 percent increase in occupant fatality risk," the researchers estimated. They further projected a total of 17,800 deaths during the life of 1989 model cars. Without fuel economy standards, they said, "the fatality toll would be much



smaller, 13,900 to 15,600." Fuel economy standards are "estimated to be responsible for 2,200 to 3,900 excess occupant fatalities over 10 years of a given model year's use," the researchers concluded.

A 1989 U.S. Department of Transportation report has pointed to an increase in fatal single-vehicle rollover crashes as an adverse safety effect of downsizing. "Narrower, lighter, shorter cars have higher rollover rates than wide, heavy, long ones under the same crash conditions. During 1970-82, as the market shifted from large domestic cars to downsized, subcompact or imported cars, the fleet became more rollover prone." The net effect of all the car size changes that have been made since 1970, the Transportation Department concluded, "is an increase of approximately 1,340 rollover fatalities each year."

So both car size and weight influence occupant safety. But weight has tradeoffs in terms of safety — it protects the people in the heavy cars, but it increases the crash forces transmitted to the occupants of lighter cars when the two collide. Car size, on the other hand, is protective in a crash without imposing penalties on the occupants of other cars.

This is important because weight has more effect than size on fuel economy, so removing weight without substantially affecting size benefits both safety and fuel economy. Many such weight reduction measures are already in place (see Technology to Meet Tougher Fuel Economy Requirements, page 6). But there's a point at which reducing car weight, in practical terms, also involves reducing car size. This is because, for example, the materials to build lighter cars without downsizing may be prohibitively expensive.

Even after a decade of downsizing and steady improvement in the fuel efficiency of Ford and General Motors cars, neither automaker is expected to meet the 1990 fuel economy standard of 27.5 miles per gallon without using credits earned in prior years. Some luxury imports don't meet the standard, either, but the resulting penalty on these relatively expensive cars is considered little more than a luxury tax.

Japanese automakers were importing mostly small cars into the United States when fuel economy standards were implemented in the 1970s. These cars easily met the federal standards — they still do — so no downsizing has been necessary. In fact, Japanese car manufacturers have for years been earning credits under fuel economy standards, allowing them to build and market larger, more powerful, less fuel efficient cars. Honda is a good example. Its cars have always met federal standards, but their average fuel economy has been declining in recent years.

Because tougher fuel economy requirements would call for each automaker to significantly improve its fleet-average fuel use, it's likely that many manufacturers will have to downsize in order to comply. This is the point at which improving fuel economy will pose a safety problem.

Bigger Is Safer But Costs Fuel

Car size is perhaps the most important single factor when it comes to protecting occupants in crashes. All other things being equal, people in larger cars sustain fewer injuries in crashes than people in smaller cars. Why? Because the smaller cars have less crush space to absorb energy and, therefore, higher crash forces are transmitted to their occupants.

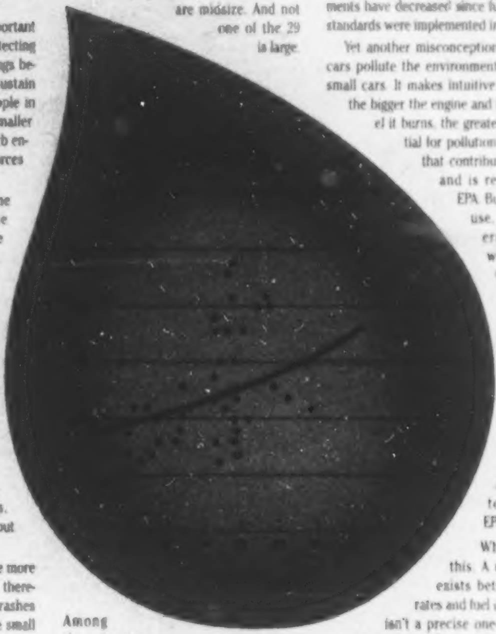
In crashes involving at least one car being towed away from the scene, a greater percentage of the occupants of small cars are killed, compared with larger cars.

Overall, the death rate in the smallest cars on the road is more than double the rate in the largest cars. For every 10,000 registered cars one to three years old in 1988, 3.0 deaths occurred in the smallest cars on the road, compared with 1.3 in the largest cars. The death rate is at least twice as high in small cars, compared with large cars, in both single- and multiple-vehicle crashes. The effects of car size are true without regard to the ages of the drivers.

Some people claim small cars are more maneuverable than large ones and, therefore, less likely to be involved in crashes in the first place. It's true that some small cars may be more maneuverable, but they're not less likely to be in crashes. The best evidence of this comes from recent insurance claims data for crash damage. The frequency of such claims for small two-door cars is 35 percent higher (worse) than for large two-door cars.

The same differences hold for four-door cars, so there's no evidence to support assertions that small cars are involved in fewer crashes than large cars. The evidence points in the other direction.

Insurance claims for occupant injuries are also more frequent in small cars than in large ones. Among the 29 two- and four-door cars with the highest frequencies of injury claims, 27 are small. Two are midsize. And not one of the 29 is large.



Among the nine two- and four-door cars with the lowest injury claim frequencies, on the other hand, seven are large. The other two are midsize, and not one of the nine is small.

Another misconception is that, because cars' interior volumes haven't changed much since fuel economy standards were implemented, cars haven't gotten any smaller or less safe since these standards. Such arguments are based on the Environmental Protection Agency's (EPA) definition of car size based on interior volume — a measurement that has little or nothing to do with safety. Wheelbase and overall car length are size dimensions that affect safety, and both of these exterior measurements have decreased since fuel economy standards were implemented in the 1970s.

Yet another misconception is that big cars pollute the environment more than small cars. It makes intuitive sense that the bigger the engine and the more fuel it burns, the greater the potential for pollution — the kind that contributes to smog and is regulated by EPA. But, in normal use, large modern engines with pollution control technology don't pollute any more than smaller ones. In fact, automobiles of all sizes are subject to the same EPA standards.

What's true is this: A relationship exists between death rates and fuel use, even if it isn't a precise one-to-one relationship (see graph, this page). According to a regression equation estimated by Institute researchers from the death rates and EPA fuel ratings of 47 four-door cars, on average every one mile-per-gallon improvement in fuel economy translates into a 3.9 percent increase in the death rate.

Congress Looking at Fuel Economy Changes

(Cont'd from p. 1)

average 34 miles per gallon by 1995, 40 miles per gallon by the 2001 model year.

The Bryan proposal is different from present fuel economy requirements, which set a single standard (27.5 miles per gallon) for all automakers. Under the proposed requirements, every manufacturer, even those now meeting the 27.5 mpg standard, would have to improve fleet fuel economy by specified percentages.

Like current fuel economy standards, Senator Bryan's proposal is less stringent for pickup trucks, vans, and utility vehicles — which account for about a third of all new passenger vehicle sales — than it is for cars.

Like current standards, too, the Bryan proposal wouldn't simply average the miles per gallon of an automaker's models in order to arrive at a fleet average. Instead, the standard would be based on how many gallons of fuel it takes for a given manufacturer's fleet of cars to go a specified distance. Called a "harmonic average," this way of measuring fuel economy has an important practical effect — it means that a disproportionate number of high-mileage cars have to be sold to offset low-mileage cars. If one car has a 40 mpg fuel rating and another gets 20 mpg, for example, it would take three gallons of gas for both cars to travel 40 miles. But the fleet average would be 26.7 miles per gallon (80 miles traveled divided by 3) instead of the simple average of 30 mpg.

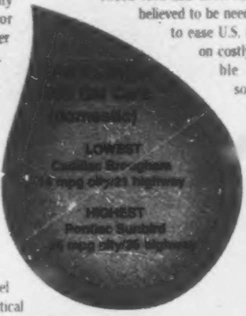
In one of the few acknowledgments so far that fuel economy standards pose safety implications, Senator Jack Danforth of Missouri got an amendment added to Bryan's proposal before it was reported out of the Committee on Commerce, Science, and Transportation. (See *Status Report*, Vol. 25, No. 6, June 30, 1990.) This amendment would encourage air bags in smaller cars — an important addition because most of the cars that are scheduled to be equipped with air bags during the next few model years are large and midsize. Without air bags, occupants of small cars will be at an even greater safety disadvantage, compared with people who travel in larger cars.

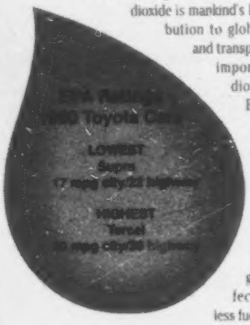
U.S. Department of Transportation staff have calculated that the fuel economy proposals now being debated in Congress would save 49 billion gallons of fuel between 1995 and 2001. Fuel saving is believed to be needed not only to ease U.S. dependence on costly and unstable foreign oil sources but also for environmental reasons — in particular, to slow global warming, which is also known as "the greenhouse effect."

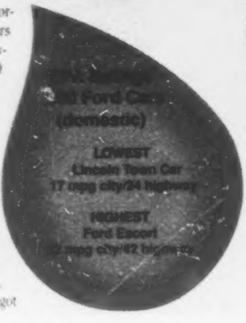
The greenhouse effect involves certain gases in the earth's atmosphere, especially carbon dioxide, trapping the sun's radiation and thus raising overall temperatures. According to the United Nation's Intergovernmental Panel on Climate Change, the average global temperature will be 4° to 9° F higher in 2070 than it was in the preindustrial period. The rate of increase in the global mean temperature will be greater in the next 30 years than during the past 10,000 years, the panel reported.

Predictions like these are based on climate models that are far from perfect, so there's disagreement on the exact pace of global warming. However, scientists generally do agree that the earth is getting warmer and that the results could include disasters like icecap surges and floods, droughts in other areas, invasions of insects, and extinctions.

What does all this have to do with the fuel economy of automobiles? Carbon dioxide is mankind's largest contribution to global warming, and transportation is an important carbon dioxide source. Emissions of carbon dioxide are directly proportional to amounts of fuel used, so one way to slow the greenhouse effect is to burn less fuel in our cars.







Technology t Fuel Economy

Some improvements in automobile fuel economy can be accomplished — without downsizing and thus compromising safety — by making engine and/or transmission technology changes. Many such changes have already been made. They just haven't been made on all new cars.

The estimated benefits of these energy-saving technologies have been repeatedly quantified, added, and presented to policymakers during recent Congressional hearings. Such estimates are subjective, though, so it's not surprising that there's such wide variation among them.

Now Insurance Institute for Highway Safety engineers have analyzed the benefits associated with various fuel economy strategics. For example:

- **Reducing car weight** by 10 percent, the most direct way to cut fuel consumption, can provide an estimated 5 percent improvement in fuel economy. Most automobile weight reductions of the past decade have involved downsizing. Weight has also been saved by switching from steel to materials of lighter weight like aluminum and plastic. However, lightweight materials for building automobiles often are more expensive — sometimes far more expensive — than steel. In practical terms, it may be difficult to realize much further weight saving without additional downsizing of cars.

- **Reducing aerodynamic drag** by 10 percent can provide an estimated 2 percent improvement in fuel economy because, as drag lessens, the amount of power needed to move a car through the air also lessens. The benefits of aerodynamic styling aren't really apparent at low speeds, but the extra power required to go 60 mph instead of 50, for example, is great enough that such styling can make a noticeable difference.

The problem is, major aerodynamic changes — the kind that can increase fuel economy markedly — might involve radical changes to current car design. Truly aerodynamic autos might be too low, too small, etc. for car buyers to accept.

In addition to studying general strategies like reducing weight and drag, Institute engineers have drawn the following conclusions about benefits associated with specific fuel economy technologies:

- **Adding extra valves** (intake and exhaust) per cylinder can provide an estimated 5 percent improvement in fuel economy by making it easier and more efficient for engines to take in fuel and air and discharge exhaust. This means engines can be made smaller, and thus more fuel efficient, without reducing performance. A small four-valve-per-cylinder engine, for example, can achieve the same horsepower as a conventional two-valve-per-cylinder engine that's larger.

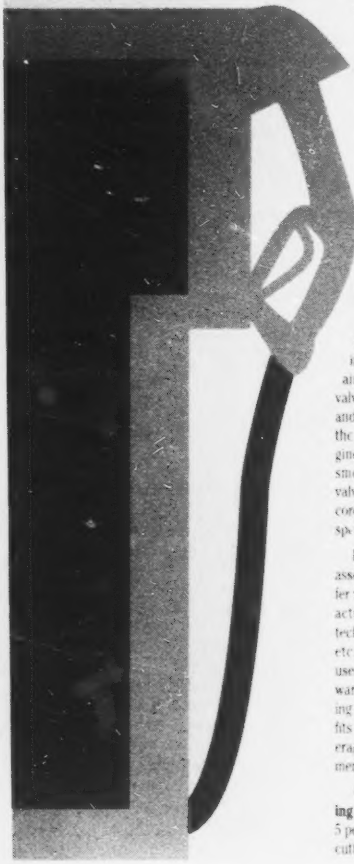
Current multivalve engines have overhead camshafts that further benefit fuel economy (see below). In fact, half or more of the estimated 5 percent improvement associated with multivalves actually comes from the overhead camshaft.

There are tradeoffs. Engineers cannot reduce engine size as much as might be expected by going to more valves, because of driveability problems associated with small multivalve engines at low speeds.

Most domestic cars still have larger two-valve-per-cylinder engines, while many Japanese models have four-valve-per-cylinder engines. However, the four-valve engine was an American invention of the 1930s, and it could be used on more domestic cars of the 1990s in order to increase fuel efficiency.

- **Changing the camshaft position** can provide an estimated 3 percent improvement in fuel economy. The camshafts in most cars used to be located low in the engine, near the crankshaft. Moving it to a higher, overhead position was an expensive proposition involving elaborate chains and belts between the camshaft and crankshaft. The advantage was — and still is — that overhead camshaft engines are more fuel efficient because they have

Meet Tougher Requirements



fewer and lighter moving parts. Such engines can run faster (i.e., at higher rpms) without engine damage, so it's possible to achieve the same horsepower with a smaller engine and save fuel. Overhead camshafts allow for optimal placement of intake and exhaust ports, too, which improves efficiency. And less engine friction is created so that less energy is lost this way.

As fuel costs rose during the 1970s and early '80s, automakers began using this technology more often. Doing so has helped fuel economy, but it may not involve as much fuel saving as has been estimated. In fact, the benefits of overhead cam, multivalve cylinder heads, and other engine changes are so closely related that sometimes they are counted twice.

- **Installing variable valve control** mechanisms can provide an estimated 3 to 5 percent improvement in fuel economy by maintaining better air and fuel flow into the engine. The valves on most of today's cars are opened and closed at fixed intervals, relative to the position of the crankshaft, for all engine operating levels. Engines run more smoothly and efficiently, though, when valve openings and closings are varied according to the engine's temperature, load, speed, and other conditions.

Estimates of the fuel economy benefit associated with variable valve control differ widely because the term "valve control" actually includes a number of different technologies that affect valve timing, lift, etc. Depending on which technology is used — and whether it's programmed toward improving fuel economy or improving performance — a wide range of benefits may be estimated. These yield, on average, an approximate 4 percent improvement in miles per gallon.

- **Applying advanced friction reducing** technologies can provide an estimated 5 percent improvement in fuel economy by cutting down on the energy that's lost to friction. Such technologies include those designed to reduce the number of engine parts that contact one another. They also include technologies designed to make engine parts fit better at a wider range of operating temperatures. Pistons, for example, may be redesigned to reduce distortion and, hence, friction from contact with the cylinder wall.

Rolling along a surface inherently involves less friction than sliding, so another example of advanced friction reducing technology is a valve lift mechanism that rolls instead of slides along the camshaft. Rolling lifters are a relatively new automobile production technology, but most other known friction reducing technologies are already in place.

- **Using fuel injection** can provide an estimated 3 to 4 percent improvement in fuel economy, depending on the type of injection system that's used. Virtually all new cars have fuel injection instead of carburetors — a fuel economy as well as performance benefit because injection provides the engine with a fuel-to-air ratio that's closer to optimum for a wider range of engine conditions. Throttle-body fuel injection systems do a good job of optimizing fuel mix, and more advanced multipoint systems can do an even better job.

- **Putting more gears** on automatic transmissions can provide an estimated 3 percent improvement in fuel economy (four-speed) plus another 2 percent improvement (five-speed), compared with three-speed automatics because, simply stated, the more gears an automobile has the more time it can be operated at or near its optimum efficiency.

This may mean either optimum fuel efficiency or optimum performance — not both. The tradeoff between fuel economy and performance is so pronounced, in fact, that a three-speed automatic transmission optimized for fuel efficiency could use less gasoline than a four-speed automatic optimized for performance.

Some estimates of the fuel saving associated with four-speed automatic transmissions are overstated because they assume the additional gear will be used exclusively toward improving fuel economy without regard to performance — an unlikely assumption. Most automobiles are geared for a compromise between the two, and the Institute's 3 percent improvement estimate for a four-speed automatic assumes such a compromise.

- **Equipping cars with continuously variable automatic transmissions** probably doesn't result in any fuel saving, compared with manual five-speeds.

In theory at least, an infinite number of gears means that a car can always be operated in the optimum gear. Based on this principle, the continuously variable transmission made its debut in a 1903 Oldsmobile model. But such transmissions haven't been used in many cars over the years because, even today, only those cars with very small engines (90 horsepower or smaller) can accommodate such a technology.

Continuously variable transmissions offer virtually no fuel benefit compared with a manual transmission. Subaru's Justy equipped with a five-speed manual gets an average of 34.5 miles per gallon (city and highway), according to Environmental Protection Agency ratings, compared with 34.7 miles per gallon for the same car with a continuously variable automatic transmission.

Any benefit from continuously variable transmissions has to be realized in stop-and-go urban traffic, where a great deal of shifting is required. On the highway, continuously variable transmissions offer little or no fuel saving at all.

- **Adding a lockup** mechanism to the torque converter on automatic transmissions can provide an estimated 3 percent improvement in a car's fuel economy by eliminating the fluid energy losses associated with transmitting power from the engine to the transmission through the torque converter. About half of all new cars — mainly midsize and large cars — have torque converter lockups.

- **Equipping cars with electronic gearshift controls** can provide an estimated 0.5 percent improvement in fuel economy. With an automatic transmission, the gears are shifted according to speed, engine rpms, and other factors. Electronic controls measure these factors and then shift the gears for optimum operation — either optimum performance and acceleration or optimum fuel economy.

The reason the fuel economy benefit from this technology is so slight is that the hydraulic gearshift controls on most cars today are so well developed that a new kind of control would offer only minimal improvement. What's really pushing automakers toward using electronic controls isn't fuel economy alone — it's the fact that such controls allow drivers the freedom to switch the transmission between optimum fuel economy and optimum performance. For example, drivers with this feature can choose to switch to lower gearing on a hilly terrain, even though it may cost extra fuel.

- **Changing to front wheel drive** can improve fuel economy by up to 2 percent, compared with rear wheel drive, because front-wheel-drive cars are lighter. However, the gains in fuel economy don't even approach the 10 percent estimate mentioned in a U.S. Department of Energy report. This is primarily because the high estimate is based on comparisons between newly designed front-wheel-drive cars and older rear-wheel-drive cars of the 1970s — an invalid comparison because substantial weight reductions unrelated to the switch from rear to front wheel drive occurred at the same time.

Comparing cars for which the only substantial change is a shift from front to rear wheel drive produces much smaller weight and fuel savings.

Going to front wheel drive has allowed automakers to mount engines transversely. Most have done so, usually at the same time as substantial downsizing. So it's not surprising that many estimates of fuel saving from front wheel drive are really from the weight reductions associated with the smaller wheelbases of downsized cars.

It's important, too, that 82 percent of all 1989 cars are front-wheel-drive models. This means most of the benefit associated with this technology may already have been realized.

- **Adding a two-speed gearbox** for power accessories can provide a small improvement in fuel economy. In today's cars, engine power operates accessories like power steering at whatever speed (engine rpm level) the car happens to be operating. This means that, at higher rpms, accessories are wastefully overpowered. It's a problem that could be reduced by adding a two-speed gearbox specifically to power accessories.

Proponents of tougher fuel economy standards say the kinds of technologies discussed above can help automakers meet new requirements without further car downsizing. Senator Howard M. Metzenbaum of Ohio, for example, said proposed requirements can be accomplished "strictly by deploying familiar, off-the-shelf technologies throughout the fleet." He later added, "In no other area of energy or environmental policy can we achieve so much gain with so little pain."

But, without downsizing, it's not this simple. Some of the technologies that enhance fuel economy aren't ready to implement fully. Others are already in wide use. Front wheel drive, for example, is a feature on so many cars already that it's questionable whether it offers much potential for further fuel saving.

Some proponents of tougher standards have overlooked the fact that several technologies are related, so their benefits shouldn't be added together. Plus, these estimated benefits don't necessarily fully account for inherent conflicts between fuel economy, performance, and driveability.

An even more basic problem with estimated fuel economy benefits from various technologies is that fuel economy isn't a function of manufacturing decisions alone. It involves a complicated mix of factors including especially consumer preference.

In today's car market, consumers are purchasing energy *consuming* instead of energy *saving* features at an escalating rate. More than 85 percent of all the new cars Ford sells, for example, are equipped with automatic transmissions. Nearly 95 percent have air conditioners. These are both features that decrease fuel economy, as do other popular features such as power windows, door locks, and seats.

Another growing trend is for cars that accelerate faster — important to the fuel economy debate because a 10 percent increase in 0-60 mph acceleration time can produce a 5 percent decrease in fuel economy. Engine horsepower to automobile weight ratios have increased in every model year since 1982, costing fuel as well as occupant deaths. Institute research on death rates for 103 car series (1985-87 models) found high-performance cars accounting for four of the five with the highest death rates.

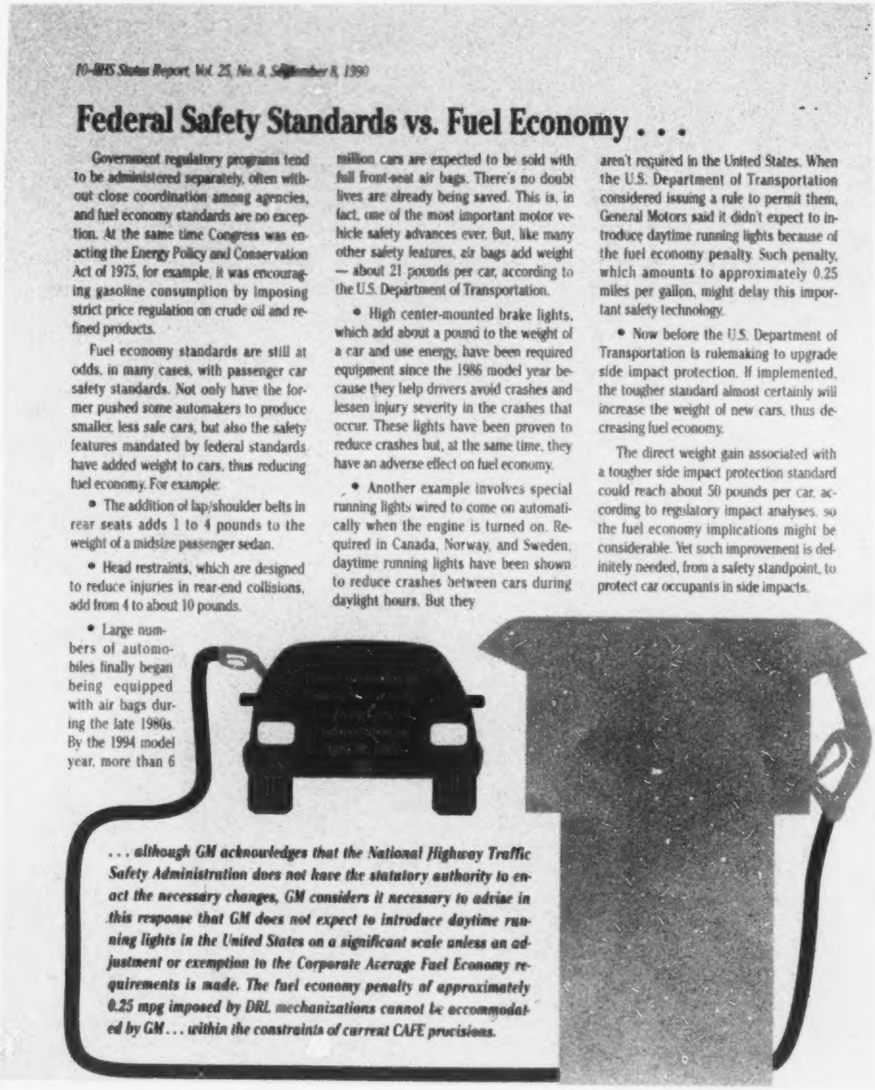
By the same token, consumers aren't purchasing cars with many of the characteristics that enhance fuel economy. Midsize cars are often marketed with either four- or six-cylinder engines, for example, but the more fuel efficient four-cylinder versions often don't sell as well as the cars with the larger engines. Diesel engines are highly fuel efficient, but they accounted for less than 0.1 percent of 1989 model new car sales, down from a high of 6 percent in the 1981 model year.

On the other hand, there are fuel-saving technologies on the horizon that motorists might accept. General Motors and Toyota, for example, have shown small cars with prototype two-stroke engines that burn less fuel than the four-stroke engines in virtually all of today's cars. Both automakers say electronic advances have solved many of the problems previously associated with two-stroke engines. They say cars with such engines could be in production as early as the 1995 model year.

But automotive technologies like the ones discussed on these pages can take us only so far toward improved fuel economy. They aren't the whole answer. Increasingly heavy traffic on U.S. roads, especially on our urban streets and highways, means lower fuel efficiency. Motorists stalled in bumper-to-bumper traffic, after all, are getting zero miles per gallon of gasoline.

The application of various technologies like front wheel drive, overhead cam, and extra transmission gears might not save as much fuel as proponents of tougher fuel economy standards expect. Why not?

- **Because some technologies are already in wide use, it's questionable whether further fuel saving is likely.**
- **Because some of the technologies aren't ready yet.**
- **Because benefits associated with more than one technology cannot always be added together.**
- **Because fuel economy improvements often involve performance tradeoffs, and some technologies are being used for performance instead of for fuel economy.**
- **Because, in today's car market, consumers are purchasing energy consuming — not energy saving — features at an escalating rate.**
- **Because, when given a choice, consumers often prefer six- over four-cylinder engines. Meanwhile, fuel efficient diesels sell poorly.**



IO-IIHS Status Report, Vol. 25, No. 8, September 8, 1990

Federal Safety Standards vs. Fuel Economy . . .

Government regulatory programs tend to be administered separately, often without close coordination among agencies, and fuel economy standards are no exception. At the same time Congress was enacting the Energy Policy and Conservation Act of 1975, for example, it was encouraging gasoline consumption by imposing strict price regulation on crude oil and refined products.

Fuel economy standards are still at odds, in many cases, with passenger car safety standards. Not only have the former pushed some automakers to produce smaller, less safe cars, but also the safety features mandated by federal standards have added weight to cars, thus reducing fuel economy. For example:

- The addition of lap/shoulder belts in rear seats adds 1 to 4 pounds to the weight of a midsize passenger sedan.
- Head restraints, which are designed to reduce injuries in rear-end collisions, add from 4 to about 10 pounds.
- Large numbers of automobiles finally began being equipped with air bags during the late 1980s. By the 1994 model year, more than 6 million cars are expected to be sold with full front-seat air bags. There's no doubt lives are already being saved. This is, in fact, one of the most important motor vehicle safety advances ever. But, like many other safety features, air bags add weight — about 21 pounds per car, according to the U.S. Department of Transportation.
- High center-mounted brake lights, which add about a pound to the weight of a car and use energy, have been required equipment since the 1986 model year because they help drivers avoid crashes and lessen injury severity in the crashes that occur. These lights have been proven to reduce crashes but, at the same time, they have an adverse effect on fuel economy.
- Another example involves special running lights wired to come on automatically when the engine is turned on. Required in Canada, Norway, and Sweden, daytime running lights have been shown to reduce crashes between cars during daylight hours. But they aren't required in the United States. When the U.S. Department of Transportation considered issuing a rule to permit them, General Motors said it didn't expect to introduce daytime running lights because of the fuel economy penalty. Such penalty, which amounts to approximately 0.25 miles per gallon, might delay this important safety technology.
- Now before the U.S. Department of Transportation is rulemaking to upgrade side impact protection. If implemented, the tougher standard almost certainly will increase the weight of new cars, thus decreasing fuel economy.

The direct weight gain associated with a tougher side impact protection standard could reach about 50 pounds per car, according to regulatory impact analyses, so the fuel economy implications might be considerable. Yet such improvement is definitely needed, from a safety standpoint, to protect car occupants in side impacts.

. . . although GM acknowledges that the National Highway Traffic Safety Administration does not have the statutory authority to enact the necessary changes, GM considers it necessary to advise in this response that GM does not expect to introduce daytime running lights in the United States on a significant scale unless an adjustment or exemption to the Corporate Average Fuel Economy requirements is made. The fuel economy penalty of approximately 0.25 mpg imposed by DRL mechanizations cannot be accommodated by GM . . . within the constraints of current CAFE provisions.

IIHS Status Report, Vol. 25, No. 8, September 8, 1990–11

. . . and Safety-Compatible Fuel Economy Alternatives

Not all fuel conservation measures are at odds with safety — just those that encourage automakers to produce smaller cars. A safety-compatible fuel economy alternative might involve slowing cars down. Traveling faster means burning more fuel, which is why the national maximum speed limit of 55 miles per hour was adopted in the mid 1970s.

Rapid acceleration also wastes fuel. Cars with very high speed and acceleration capabilities have not only the worst fuel economy ratings but also the highest occupant death rates. So, if we produced fewer high performance cars, both safety and fuel economy would be served.

Because of engine improvements, newer cars achieve much more power per unit of engine displacement than older cars. But this advancement isn't being used entirely toward improving fuel economy. A large part of it is being used toward improving cars' acceleration and, in some cases, toward increasing top speeds.

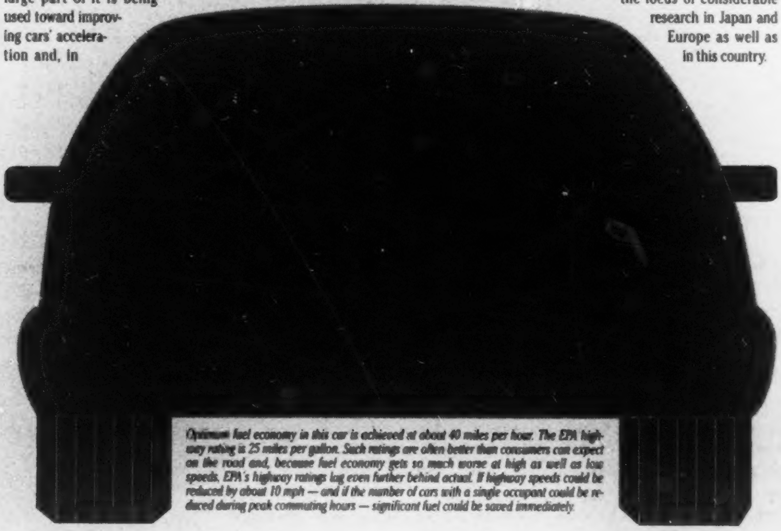
Reversing this trend and applying engine efficiency improvements to fuel economy not only would increase the miles-per-gallon average of new cars but also would enhance safety by holding down speed. If the top speed of every car were controlled electronically at, for example, 70 mph, both safety and fuel economy would gain. Current technology allows for electronic controls without any adverse effect on cars' acceleration at slower speeds.

No matter how fuel efficient our cars become, though, urban traffic management has to be improved in order for fuel to be saved. The volume of traffic on U.S. streets and highways is growing year by year. Increasingly frequent traffic snarls are wasting large amounts of motorists' time as well as their gasoline while they're slowed or even stopped in traffic jams.

A whole array of electronic features are being considered for cars and highways to help urban traffic move more smoothly. For example, roadway sensors and other surveillance devices that detect traffic conditions and automatically adjust traffic control devices (intersection and ramp metering signals, etc.) could be installed. In-car devices that receive information from these roadway sensors could help drivers navigate and avoid traffic jams, thus saving fuel.

Crash warning devices could also be installed in cars. These would electronically sense the presence of other vehicles or objects on the road, warn drivers to brake or take evasive action, and thus reduce crashes and the traffic interruptions they cause.

These approaches to traffic management comprise the so-called "intelligent vehicle-highway system," a concept that's the focus of considerable research in Japan and Europe as well as in this country.



Optimum fuel economy in this car is achieved at about 40 miles per hour. The EPA highway rating is 25 miles per gallon. Such ratings are often better than consumers can expect on the road and, because fuel economy gets so much worse at high as well as low speeds, EPA's highway ratings lag even further behind actual. If highway speeds could be reduced by about 10 mph — and if the number of cars with a single occupant could be reduced during peak commuting hours — significant fuel could be saved immediately.

Deaths per 10,000 Registered Cars in Calendar Years 1985-1989
GM Models Before and After Downsizing

		Before Downsizing		After Downsizing		
	Car Type Downsized	Model Years	Death Rate	Model Years	Death Rate	Percent Change in Rate
1.	B Car	1975-76	1.2	1977-78	1.4	+ 17
2.	C/D Car	1975-76	1.1	1977-78	1.2	+ 9
	All other GM	1975-76	2.2	1977-78	2.2	0
3.	A/G Car	1976-77	1.7	1978-79	1.8	+ 6
	All other GM	1976-77	2.5	1978-79	2.6	+ 4
4.	E Car	1977-78	0.9	1979-80	1.1	+ 22
	All other GM	1977-78	1.9	1979-80	1.8	- 5
5.	X Car	1978-79	1.9	1980-81	2.2	+ 16
	All other GM	1978-79	1.9	1980-81	1.7	- 11
6.	A Car	1980-81	1.5	1982-83	1.5	0
7.	F Car	1980-81	2.3	1982-83	3.3	+ 43
	All other GM	1980-81	1.8	1982-83	1.7	- 6
8.	Y Car	1981-82	3.9	1984*	4.4	+ 13
	All other GM	1981-82	1.7	1983-84	1.7	0
9.	C/D Car	1983-84	1.0	1985-86	1.3	+ 30
	All other GM	1983-84	1.9	1985-86	2.0	+ 5
10.	B/H Car	1984-85	1.1	1986-87	1.4	+ 27
11.	E Car	1984-85	0.9	1986-87	1.5	+ 67
	All other GM	1984-85	2.1	1986-87	2.3	+ 10

Results for downsized cars are in bold type.

1. 1975-76 compared with 1977-78 model Chev. Impala, Caprice; Pont. Catalina, Bonneville, Gr. Safari, Grandville; Buick LeSabre; and Olds Delta 88

2. 1975-76 compared with 1977-78 model Buick Electra; Cadillac Calais, DeVille, Fleetwood Brougham; and Olds 98

3. 1976-77 compared with 1978-79 model Chev. Malibu, Chevelle, Monte Carlo; Pont. LeMans, Gr. Prix, Gr. Am; Buick Century, Regal; and Olds Cutlass

4. 1977-78 compared with 1979-80 model Cadillac Eldorado and Olds Toronado

5. 1978-79 compared with 1980-81 model Chev. Nova, Citation; Pont. Phoenix; Buick Skylark; and Olds Omega

6. 1980-81 Chev. Malibu; Pont. LeMans, Grand Am; Buick Century; and Olds Cutlass (exc. Supreme, Calais) compared with 1982-83 model Chev. Celebrity, Pont. 6000, Buick Century, and Olds Cutlass Ciera

7. 1980-81 compared with 1982-83 model Chev. Camaro and Pont. Firebird

8. 1981-82 compared with 1984 model Chev. Corvette.
*Downsized Corvettes were introduced early in calendar year 1983 and called 1984 models.

9. 1983-84 rear-wheel-drive Buick Electra, Olds 98 (exc. wagon) and Cadillac Deville, Fleetwood (exc. limo) compared with front-wheel-drive 1985-86 models

10. 1984-85 compared with 1986-87 model Buick LeSabre and Olds Delta 88 (exc. wagon)

11. 1984-85 compared with 1986-87 model Buick Riviera, Cadillac Eldorado, and Olds Toronado

Note: N Cars (Buick Somerset/Skylark, Pont. Gr. Am, Olds Calais) aren't included because downsized 2-door models were introduced in 1985, 4-door in 1986

STATUS REPORT
INSURANCE INSTITUTE FOR HIGHWAY SAFETY
Vol. 24, No. 11
November 25, 1989

Death Rates Vary Among Cars by More Than 700 Percent

Occupant deaths occur far more often in some cars than in others. Insurance Institute for Highway Safety researchers computed death rates for 1985-87 cars and found that, among the 103 biggest-selling vehicle series, the one with the lowest death rate is Volvo's four-door 740/760, a midsize specialty car, with 0.6 deaths for each 10,000 of these cars registered. The series with the highest death rate (5.2) is the Chevrolet Corvette, a small sports car. The Corvette's death rate is more than eight times as high as the Volvo's (see table on pages 4-5).

For each vehicle series, rates were computed from the total number of occupant deaths and registrations that occurred in the three calendar years, 1986-88. (A vehicle series is a family of cars within a make that has the same wheelbase and a degree of commonality in construction such as body, chassis, etc.) Results for individual 1985-87 series are presented only for those with at least 150,000 registrations during 1986-88 (1988 models aren't included because registrations are counted midyear when new cars are still being sold). Results for all cars and for each car size/body style group were computed from death and registration counts for all vehicle series, regardless of the numbers registered.

Car size is an important influencing

(See 700% Variation, p. 2)

During 1986-88 than 75,000 occupants of passeng s died in highway crashes. What kind rs were they traveling in? Do some ca higher death rates than others? And how much higher? How does car size death rates? What else affects these r

This special St eport focuses exclusively on death ra on-the-road crashes — not crash test r or insurance claims data for injuries able on pages 4-5 shows occupant d er 10,000 registered cars by make and arranged according to size and body st

Many Cars Performing Better (or Worse) Than Predicted

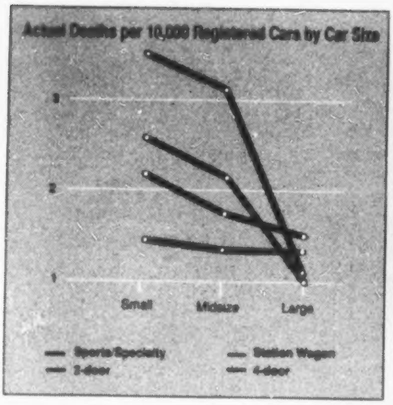
Actual death rates for individual car series tell only part of the story (see Death Rates Vary Among Cars by More Than 700 Percent) because they're influenced by the age and sex of the people who drive them, as well as by the size of the cars. So Insurance Institute for Highway Safety researchers computed for each of 103 popular car series a predicted as well as an actual death rate, with the predicted rate taking into account the three important factors influencing the actual death rate. The researchers developed a regression model relating actual death rates to car size, driver age, and driver sex. Because vehicle registration information cannot be broken down by age and sex, the researchers' model uses information about the drivers in the fatal crashes.

Specifically, the researchers estimated a nonlinear relationship between the death rates of individual vehicle series and their wheelbases, proportion of occupant deaths that occurred with drivers under 30 years old, and proportion of male drivers. (A detailed explanation of the research methods is available from the Institute on request.)

From this model, the researchers computed a predicted death rate for each car series using its actual wheelbase, proportion of young drivers, and proportion of male drivers. Then the researchers com-

(See Better or Worse, p. 3)

SPECIAL ISSUE: OCCUPANT DEATH RATES BY CAR SERIES



700% Variation

(Cont'd from p. 1)

factor on death rates. Of the 10 individual vehicle series with the lowest death rates, three are large and six are midsize cars. Only one is a small car. Twelve of the 15 cars with the highest death rates are small. The other three are midsize. None are large.

Large two-door cars are the size/body style group with the fewest deaths per 10,000 registered cars. The next best group is large specialty cars, followed by large and midsize station wagons. The group with the highest number of deaths per 10,000 registered vehicles is small sports/specialty cars.

Death rates vary not only by car size but also *within* size and body style groups. Among small four-door cars, for example, the Volkswagen Jetta has the lowest death rate (1.1). The rate for the four-door Chevrolet Chevette, another small car, is nearly four times as high (4.1).

The mix of occupant deaths between single- and multiple-vehicle crashes varies considerably, too, with small cars usually having a higher proportion of their deaths in single-vehicle crashes, compared to large cars. Chevrolet's Corvette has the highest proportion of single-vehicle crash deaths (81 percent) among all 103 car series, and Oldsmobile's Cutlass Ciera station wagon has the lowest (13 percent).

Another important influence on death rates, besides car size, is driver age. Cars with high percentages of fatal crash-involved drivers who are under 30 years old tend to have higher death rates. The sex of the driver is important, too. Cars with high percentages of female drivers tend to have lower death rates (see table on pages 6-7).

These three factors — car size and driver age and sex — explain some of the differences in death rates among cars. But they don't explain them all. The Honda Prelude, for example, has a relatively low death rate (1.5), even though it's small and has a relatively high percentage of drivers under 30 (47 percent). Its percentage of male drivers is about average (50 percent).

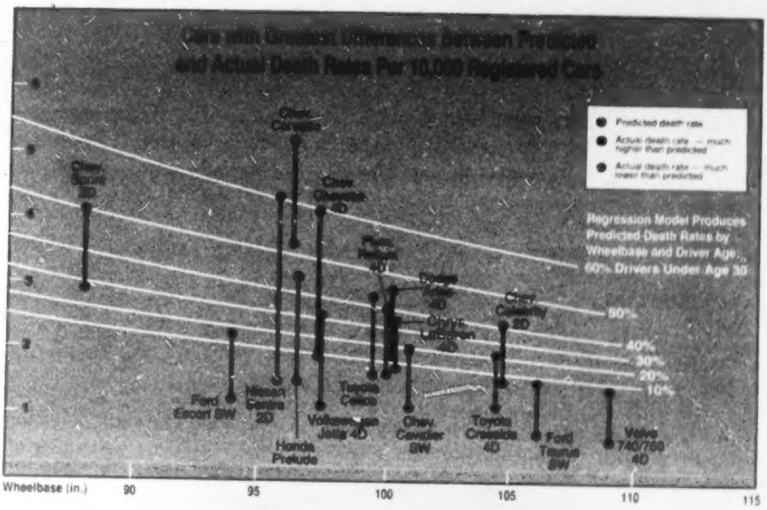
To account for the effects of car size and driver age and sex on death rates, Institute researchers used a regression model with these three variables to compute a predicted death rate for each car series. Then they compared predicted and actual rates (see Many Cars Performing Better or Worse Than Predicted, page 1).

Lowest Death Rates

- Volvo 740/760 4-door (0.6)
- Ford Taurus station wagon (0.7)
- Lincoln Town Car (0.8)
- Audi 5000 4-door (1.1)
- Cadillac Fleetwood/DeVille 4-door (1.1)
- Cadillac Fleetwood/DeVille 2-door (1.1)
- Chevrolet Cavalier station wagon (1.1)
- Olds Cutlass Ciera station wagon (1.1)
- Toyota Cressida 4-door (1.1)
- Volkswagen Jetta 4-door (1.1)

Highest Death Rates

- Chevrolet Corvette (5.2)
- Chevrolet Camaro (4.9)
- Dodge Charger/Shelby (4.5)
- Ford Mustang (4.4)
- Nissan 300ZX (4.2)
- Chevrolet Chevette 4-door (4.1)
- Chevrolet Sprint 2-door (4.1)
- Honda Civic CRX (3.8)
- Pontiac Firebird (3.8)
- Plymouth Turismo (3.6)
- Pontiac Fiero (3.6)
- Chevrolet Chevette 2-door (3.4)
- Chevrolet Spectrum 4-door (3.2)
- Dodge Daytona 2-door (3.1)
- Ford Escort 2-door (3.0)

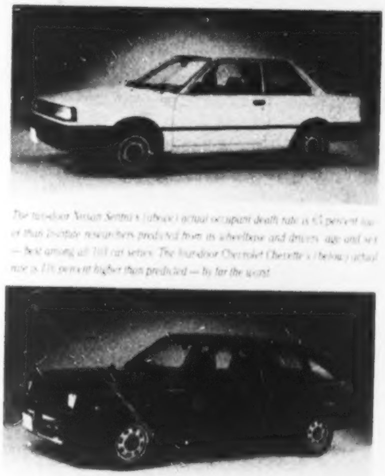


Better or Worse

(Cont'd from p. 1)

pared predicted death rates with actual ones. Among 103 vehicle series (1985-87 model years) for which actual and predicted death rates were computed, 58 performed better than predicted during calendar years 1986-88. Thirty-nine performed worse. Six cars have actual occupant death rates that match their predicted rates.

What's especially interesting are the differences that Institute researchers found between cars' predicted and actual death rates. This comparison tells us how much better or worse each of the cars is performing than we would expect, given the car's size and the age and sex of the drivers who are in its fatal crashes.

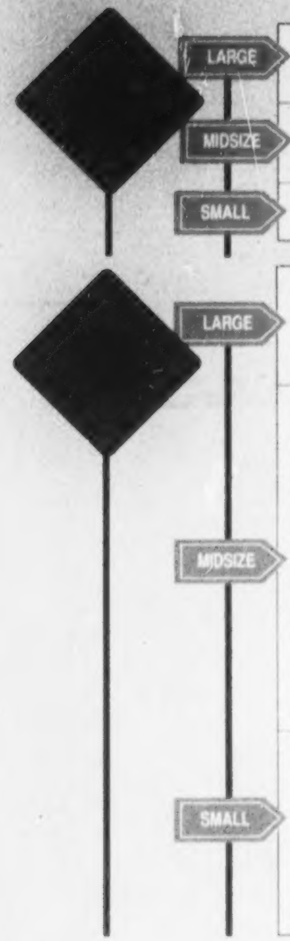


The two-door Nissan Sentra's (above) actual occupant death rate is 63 percent lower than Institute researchers predicted from its wheelbase and drivers' age and sex — best among all 103 car series. The four-door Chevrolet Chevette's (below) actual rate is 115 percent higher than predicted — by far the worst.

Among all 103 vehicle series, the following nine perform far better than predicted after taking car size and the age and sex of drivers into account: Nissan Sentra two-door, Volvo 740/760 four-door, Volkswagen Jetta four-door, Ford Taurus station wagon, Honda Prelude, Chevrolet Cavalier station wagon, Ford Escort station wagon, Toyota Celica, and Toyota Cressida four-door.

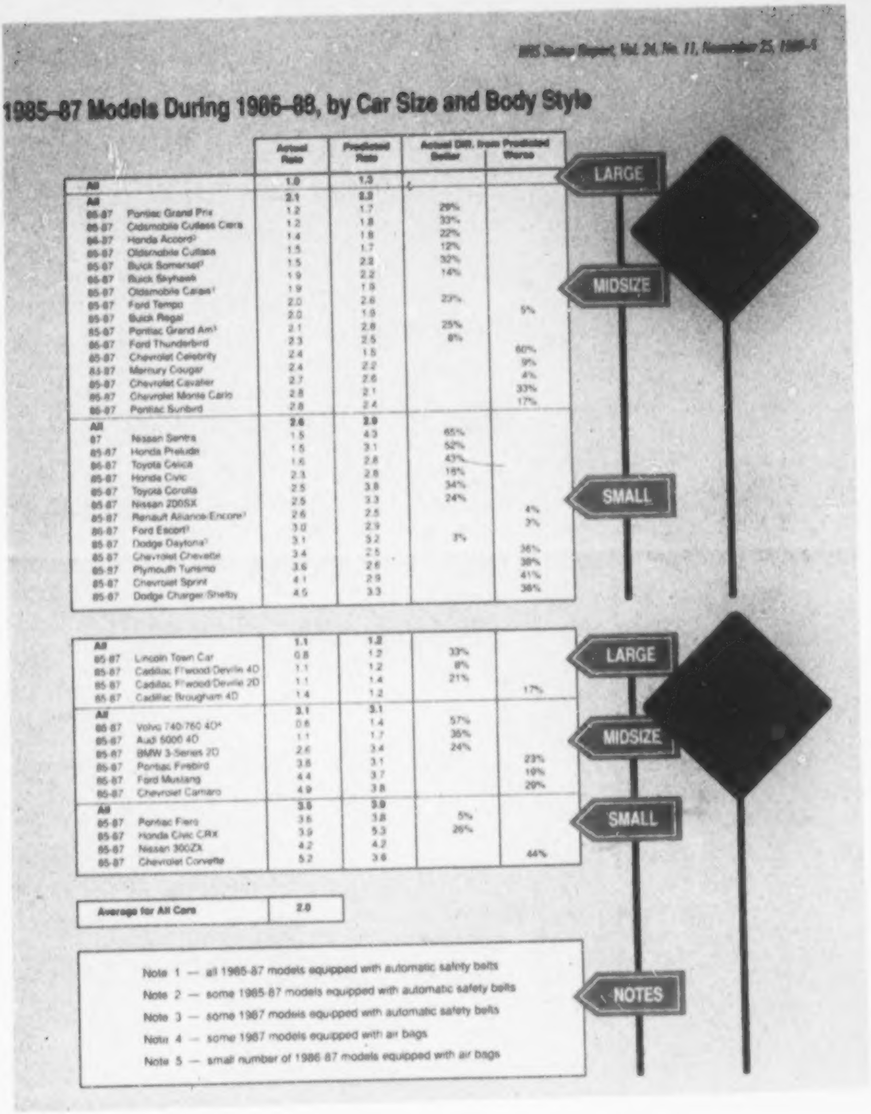
The following seven cars perform far worse than predicted: Chevrolet Chevette four-door, Plymouth Reliant four-door, Chevrolet Celebrity two-door, Dodge Aries four-door, Chevrolet Corvette, Chrysler LeBaron four-door, and Chevrolet Sprint two-door.

Actual and Predicted Deaths per 10,000 Registered Passenger Cars,



		Actual Rate	Predicted Rate	Actual Diff. from Predicted Better	Worse
All		**1.3**	**1.6**		
85-87	Plymouth Voyager	1.2	1.4	14%	
85-87	Chevrolet Caprice	1.4	1.7	18%	
85-87	Dodge Caravan	1.4	1.3		8%
86-87	Ford Aerostar	1.5	1.2		25%
85-87	Chevrolet Astro Van	2.0	2.1	5%	
All		**1.3**	**1.7**		
86-87	Ford Taurus	0.7	1.5	53%	
85-87	Oldsmobile Cutlass Ciera	1.1	1.5	27%	
85-87	Chevrolet Cavalier	1.1	2.0	45%	
85-87	Chevrolet Celebrity	1.3	1.7	24%	
85-87	Plymouth Reliant	2.0	1.6		25%
All		**1.4**	**1.9**		
85-87	Subaru DL/GL 4WD	1.2	2.0	40%	
86-87	Ford Escort	1.2	2.2	45%	
85-87	Subaru DL/GL	1.4	1.7	18%	

All		**1.5**	**1.4**		
85-87	Mercury Grand Marquis	1.2	1.5	20%	
85-87	Buick Electra	1.3	1.4	7%	
85-87	Ford Crown Victoria	1.4	1.6	13%	
85-87	Chrysler New Yorker 5th Ave	1.5	1.2		25%
86-87	Oldsmobile Delta 88	1.5	1.3		15%
85-87	Oldsmobile Ninety Eight	1.5	1.5		
85-87	Chevrolet Caprice/Impala	1.6	1.4		14%
86-87	Buick LeSabre	1.8	1.4		29%
All		**1.7**	**1.7**		
86-87	Toyota Cressida	1.1	1.6	32%	
85-87	Buick Century	1.2	1.6	25%	
85-87	Volvo 240	1.2	1.9	37%	
86-87	Pontiac Grand Am	1.2	1.9	37%	
85-87	Oldsmobile Cutlass Ciera	1.3	1.5	13%	
85-87	Chrysler LeBaron GTS	1.3	1.7	24%	
86-87	Mercury Sable	1.3	2.0	35%	
85-87	Pontiac 6000	1.3	1.7	24%	
86-87	Ford Taurus	1.4	2.0	30%	
86-87	Oldsmobile Calais	1.4	1.9	26%	
86-87	Honda Accord	1.5	1.7	12%	
85-87	Mercury Topaz	1.6	2.0	20%	
85-87	Oldsmobile Cutlass	1.6	1.3		23%
85-87	Chrysler New Yorker	1.6	1.6		
85-87	Plymouth Caravelle	1.7	1.4		21%
85-87	Chevrolet Celebrity	1.7	1.6		6%
85-87	Ford Tempo	1.8	1.8		
85-87	Dodge Lancer	1.9	2.0	5%	
85-87	Nissan Maxima	2.0	2.5	20%	
85-87	Chevrolet Cavalier	2.1	1.7		21%
85-87	Dodge 600	2.3	1.8		28%
85-87	Chrysler LeBaron	2.4	1.7		41%
85-87	Pontiac Sunbird	2.5	1.8		39%
85-87	Plymouth Reliant	2.6	1.6		63%
85-87	Dodge Aries	2.9	1.8		61%
All		**2.1**	**2.2**		
85-87	Volkswagen Jetta	1.1	2.6	58%	
85-87	Mazda 626	1.5	2.0	25%	
85-87	Toyota Corolla	1.6	2.3	30%	
85-87	Honda Civic	1.7	2.6	35%	
86-87	Ford Escort	1.8	2.7	33%	
85-87	Chevrolet Nova	2.0	2.1	5%	
85-87	Volkswagen Golf	2.0	2.5	20%	
85-87	Subaru DL/GL Sedan	2.0	1.8		11%
85-87	Dodge Omni	2.3	1.7		[illegible]
85-87	Renault Alliance/Encore	2.5	1.9		32%
86-87	Hyundai Excel	2.6	2.6		
85-87	Plymouth Horizon	2.8	2.1		33%
85-87	Chevrolet Spectrum	3.2	2.5		28%
85-87	Chevrolet Chevette	4.1	1.9		[illegible]



1985–87 Models During 1986–88, by Car Size and Body Style

			Actual Rate	Predicted Rate	Actual Diff. from Predicted	
					Better	Worse
LARGE	All		1.0	1.3		
MIDSIZE	All		2.1	2.2		
	86-87	Pontiac Grand Prix	1.2	1.7	29%	
	85-87	Oldsmobile Cutlass Ciera	1.2	1.8	33%	
	86-87	Honda Accord²	1.4	1.8	22%	
	85-87	Oldsmobile Cutlass	1.5	1.7	12%	
	85-87	Buick Somerset²	1.5	2.2	32%	
	86-87	Buick Skyhawk	1.9	2.2	14%	
	85-87	Oldsmobile Calais¹	1.9	1.9		
	85-87	Ford Tempo	2.0	2.6	23%	
	85-87	Buick Regal	2.0	1.9		5%
	85-87	Pontiac Grand Am¹	2.1	2.8	25%	
	86-87	Ford Thunderbird	2.3	2.5	8%	
	85-87	Chevrolet Celebrity	2.4	1.5		60%
	85-87	Mercury Cougar	2.4	2.2		9%
	85-87	Chevrolet Cavalier	2.7	2.6		4%
	86-87	Chevrolet Monte Carlo	2.8	2.1		33%
	86-87	Pontiac Sunbird	2.8	2.4		17%
SMALL	All		2.6	2.9		
	87	Nissan Sentra	1.5	4.3	65%	
	85-87	Honda Prelude	1.5	3.1	52%	
	86-87	Toyota Celica	1.6	2.8	43%	
	85-87	Honda Civic	2.3	2.8	18%	
	85-87	Toyota Corolla	2.5	3.8	34%	
	85-87	Nissan 200SX	2.5	3.3	24%	
	85-87	Renault Alliance/Encore¹	2.6	2.5		4%
	86-87	Ford Escort³	3.0	2.9		3%
	85-87	Dodge Daytona³	3.1	3.2	3%	
	85-87	Chevrolet Chevette	3.4	2.5		36%
	85-87	Plymouth Turismo	3.6	2.6		38%
	85-87	Chevrolet Sprint	4.1	2.9		41%
	85-87	Dodge Charger/Shelby	4.5	3.3		36%

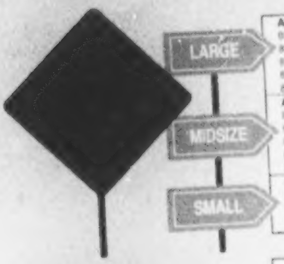
LARGE	All		1.1	1.2		
	85-87	Lincoln Town Car	0.8	1.2	33%	
	85-87	Cadillac F'wood/Deville 4D	1.1	1.2	8%	
	85-87	Cadillac F'wood/Deville 2D	1.1	1.4	21%	
	85-87	Cadillac Brougham 4D	1.4	1.2		17%
MIDSIZE	All		3.1	3.1		
	86-87	Volvo 740/760 4D⁴	0.6	1.4	57%	
	85-87	Audi 5000 4D	1.1	1.7	35%	
	85-87	BMW 3-Series 2D	2.6	3.4	24%	
	85-87	Pontiac Firebird	3.8	3.1		23%
	85-87	Ford Mustang	4.4	3.7		19%
	85-87	Chevrolet Camaro	4.9	3.8		29%
SMALL	All		3.5	3.9		
	85-87	Pontiac Fiero	3.6	3.8	5%	
	85-87	Honda Civic CRX	3.9	5.3	26%	
	85-87	Nissan 300ZX	4.2	4.2		
	85-87	Chevrolet Corvette	5.2	3.6		44%

Average for All Cars	2.0

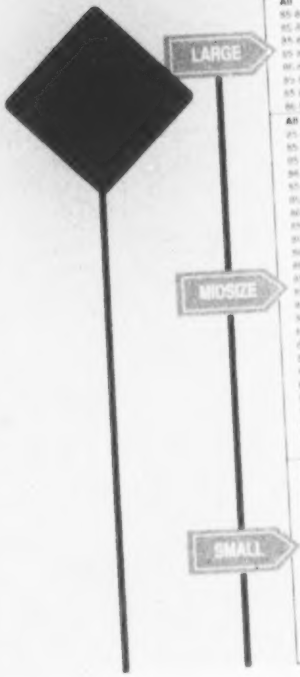
NOTES

Note 1 — all 1985-87 models equipped with automatic safety belts
Note 2 — some 1985-87 models equipped with automatic safety belts
Note 3 — some 1987 models equipped with automatic safety belts
Note 4 — some 1987 models equipped with air bags
Note 5 — small number of 1986-87 models equipped with air bags

Additional Information About Cars Listed on Pages 4 and 5



			Wheelbase	Registration Counts	Percent Young	Percent Male	Percent Single-Vehicle
LARGE	All		113	2171626	8	72	38
	85-87	Plymouth Voyager	112	424257	10	60	42
	85-87	Chevrolet Caprice	116	257961	5	83	51
	85-87	Dodge Caravan	112	441432	8	60	28
	86-87	Ford Aerostar	119	345795	3	70	47
	85-87	Chevrolet Astro Van	111	237331	10	65	36
MIDSIZE	All		103	2422393	11	59	28
	86-87	Ford Taurus	106	192635	8	62	38
	85-87	Oldsmobile Cutlass Ciera	105	208594	9	54	13
	85-87	Chevrolet Cavalier	101	333760	20	45	24
	85-87	Chevrolet Celebrity *	105	474547	8	46	38
	85-87	Plymouth Reliant	100	155117	13	41	15
SMALL	All		95	1398753	15	51	27
	85-87	Subaru DL GL 4WD	97	297927	22	53	41
	86-87	Ford Escort	94	216744	41	62	26
	85-87	Subaru DL/GL	97	252298	4	50	21



			Wheelbase	Registration Counts	Percent Young	Percent Male	Percent Single-Vehicle
LARGE	All		112	5332746	7	67	29
	85-87	Mercury Grand Marquis	114	659135	[illegible]	71	26
	85-87	Buick Electra	111	614113	[illegible]	61	36
	85-87	Ford Crown Victoria	114	949393	5	[illegible]	8
	85-87	Chrysler New Yorker 5th Ave	113	476408	6	57	17
	86-87	Oldsmobile Delta 88	111	504910	4	56	24
	85-87	Oldsmobile Ninety Eight	111	725030	[illegible]	54	[illegible]
	85-87	Chevrolet Caprice/Impala	116	973997	[illegible]	74	[illegible]
	86-87	Buick LeSabre	111	287109	[illegible]	67	[illegible]
MIDSIZE	All		103	14259931	15	57	30
	85-87	Toyota Cressida	104	228934	[illegible]	[illegible]	[illegible]
	85-87	Buick Century	105	169525	[illegible]	53	19
	85-87	Volvo 240	104	164189	4	73	18
	86-87	Pontiac Grand Am	103	236666	11	46	41
	85-87	Oldsmobile Cutlass Ciera	105	1418519	12	61	8
	85-87	Chrysler LeBaron GTS	103	204815	[illegible]	[illegible]	31
	86-87	Mercury Sable	106	204331	16	50	13
	85-87	Pontiac 6000	105	858217	8	52	28
	86-87	Ford Taurus	106	672402	13	75	15
	86-87	Oldsmobile Calais	103	1552713	3	[illegible]	18
	86-87	Honda Accord	102	751310	10	57	31
	85-87	Mercury Topaz	100	824770	26	54	8
	85-87	Oldsmobile Cutlass	106	451414	[illegible]	60	14
	85-87	Chrysler New Yorker	103	543909	8	58	20
	85-87	Plymouth Caravelle	103	220930	11	38	21
	85-87	Chevrolet Celebrity	105	1511662	12	58	24
	86-87	Ford Tempo	100	1136932	13	56	32
	85-87	Dodge Lancer	103	257109	20	54	4
	85-87	Nissan Maxima	100	504610	10	59	47
	85-87	Chevrolet Cavalier	101	343020	26	50	10
	85-87	Dodge 600	103	194630	11	64	7
	85-87	Chrysler LeBaron	100	265464	6	67	19
	85-87	Pontiac Sunbird	101	246949	21	48	19
	85-87	Plymouth Reliant	100	421025	4	56	21
	85-87	Dodge Aries	100	171880	12	58	[illegible]
SMALL	All		96	6311723	27	54	35
	85-87	Volkswagen Jetta	97	429045	34	61	40
	85-87	Mazda 626	99	165292	13	53	[illegible]
	85-87	Toyota Corolla	96	721369	31	54	[illegible]
	85-87	Honda Civic	97	420643	14	61	14
	86-87	Ford Escort	94	367139	26	[illegible]	41
	85-87	Chevrolet Nova	99	561412	[illegible]	49	[illegible]
	85-87	Volkswagen Golf	97	171413	14	[illegible]	[illegible]
	85-87	Subaru DL GL Sedan	97	244118	[illegible]	[illegible]	40
	85-87	Dodge Omni	99	393053	[illegible]	[illegible]	[illegible]
	85-87	Renault Alliance Encore	98	258541	18	[illegible]	8
	86-87	Hyundai Excel	94	359094	31	[illegible]	30
	85-87	Plymouth Horizon	99	462259	29	[illegible]	[illegible]
	85-87	Chevrolet Spectrum	95	257252	37	47	[illegible]
	85-87	Chevrolet Chevette	97	235060	41	35	[illegible]

		Wheelbase	Registration Counts	Percent Young	Percent Male	Percent Single-Vehicle
All		**112**	**[illegible]**	**8**	**60**	**24**
All		**104**	**8211293**	**32**	**62**	**46**
85-87	Pontiac Grand Prix	108	265346	29	52	48
85-87	Oldsmobile Cutlass Ciera	105	216330	15	68	22
86-87	Honda Accord	102	183179	20	57	44
85-87	Oldsmobile Cutlass	108	849302	18	63	45
85-87	Buick Somerset	103	410854	23	60	46
85-87	Buick Skyhawk	101	256783	38	50	40
85-87	Oldsmobile Calais	103	500293	28	50	33
85-87	Ford Tempo	100	360532	32	71	45
85-87	Buick Regal	108	574254	26	65	54
85-87	Pontiac Grand Am	103	614476	42	68	45
85-87	Ford Thunderbird	104	836119	33	71	51
85-87	Chevrolet Celebrity	105	156198	16	46	38
85-87	Mercury Cougar	104	676456	30	65	48
85-87	Chevrolet Cavalier	101	796638	45	52	42
85-87	Chevrolet Monte Carlo	108	615309	32	67	51
85-87	Pontiac Sunbird	101	284260	38	56	58
All		**95**	**6029295**	**42**	**57**	**48**
87	Nissan Sentra	96	219194	59	63	50
85-87	Honda Prelude	97	417450	47	60	40
86-87	Toyota Celica	99	291992	46	52	46
85-87	Honda Civic	94	341379	37	60	40
85-87	Toyota Corolla	95	234437	53	63	51
85-87	Nissan 200SX	96	281220	41	70	57
85-87	Renault Alliance Encore	98	247267	42	45	27
86-87	Ford Escort	94	601516	40	58	51
85-87	Dodge Daytona	97	248338	44	56	61
85-87	Chevrolet Chevette	94	228112	35	52	35
85-87	Plymouth Turismo	97	246854	44	44	44
85-87	Chevrolet Sprint	88	179729	30	50	22
85-87	Dodge Charger Shelby	97	264532	48	63	57

All		**114**	**2280617**	**4**	**61**	**32**
85-87	Lincoln Town Car	117	528888	6	66	26
85-87	Cadillac Fl'wood/Deville 4D	111	797011	2	50	26
85-87	Cadillac Fl'wood/Deville 2D	111	222238	8	61	33
85-87	Cadillac Brougham 4D	122	299773	2	73	22
All		**103**	**4188458**	**42**	**76**	**62**
85-87	Volvo 740/760 4D	109	240544	7	62	53
85-87	Audi 5000 4D	106	236559	15	64	56
85-87	BMW 3-Series 2D	101	196049	38	82	66
85-87	Pontiac Firebird	101	505787	41	75	63
85-87	Ford Mustang	101	816331	56	75	39
85-87	Chevrolet Camaro	101	923385	47	79	68
All		**92**	**1994292**	**43**	**74**	**61**
85-87	Pontiac Fiero	93	378815	48	68	47
85-87	Honda Civic CRX	87	332496	60	64	48
85-87	Nissan 300ZX	91	264437	41	79	69
85-87	Chevrolet Corvette	96	167869	30	85	83

Average for All Cars	103	54978352	27	62	41

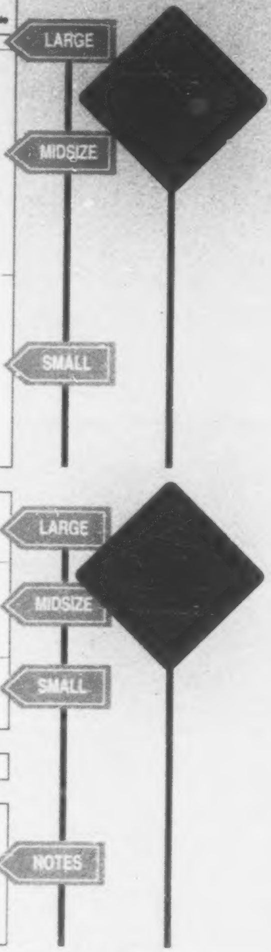
Wheelbase — length in inches

Registration Counts — sum of vehicles registered in each calendar year

Percent Young — percent of deaths in cars with drivers under age 30

Percent Male — percent of deaths in cars with male drivers

Percent Single-Vehicle — percent of deaths in single-vehicle crashes



NATIONAL ENERGY SECURITY ACT OF 1991

(Subtitle A of Title XI)

WEDNESDAY, MARCH 20, 1991

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:38 a.m. in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, U.S. SENATOR FROM LOUISIANA

The CHAIRMAN. The hearing will come to order.

Today the committee is holding its second hearing on CAFE standards. The purpose of this hearing is to receive testimony on what levels of fuel economy are feasible in a technical sense by 1996 and 2001 according to the assumptions set forth in S. 341.

Let me review those assumptions. I have a chart prepared that lists them. I am sorry that you all in the audience cannot see the chart, but it is important that all these senators up here see them.

[Laughter.]

The CHAIRMAN. Those assumptions are, first, emissions, that it meets all applicable emission standards under the Clean Air Act; second, safety, to meet all applicable safety standards; third, size, maintain 1990 size mix; and fourth, performance, maintain 1990 performance levels.

The fifth assumption is technology. This is the most complex of all to deal with. First, we must assume what types of technologies could be used by 1996 or 2001. Second, we must assume something about the market penetration of those technologies.

At one extreme we could assume that market penetration would be very slow due to the financial constraints in the auto industry and lack of consumer acceptance. In this case, market penetration rates would be very low and we would arrive at a lower bound estimate of fuel economy potential.

At the other extreme, we could assume 100 percent market penetration of all fuel saving technologies and arrive at an upper bound on fuel economy potential. What is achievable lies between those two extremes.

The example I would use is, I think maybe Mr. Duleep will tell us that one of the things that saves fuel is a five-speed transmission. Well, not everyone—my mother is not going to drive a five-speed transmission or a car that is shaped like a Ferrari Testarossa. But those would be things that would increase fuel economy.

So what is achievable lies between the two extremes. There is no absolutely correct assumption to make on technology. It requires informed judgment.

The testimony we hear today should help the committee make that judgment. It will involve some technical terms that members may not be familiar with. So staff has prepared a one-page guide to some of the technology. I would encourage my colleagues to keep this handy. Attached to this guide are copies of some charts that will be displayed during the hearing.

Let me add one final note. As many of you know, yesterday the Commerce Committee reported Senator Bryan's bill, S. 279, I believe that the Bryan bill would set CAFE standards that could not be achieved without requiring consumers to buy cars with reduced size and performance. I say, require consumers to buy cars. You cannot, or at least they make no attempt to require consumers to buy cars which would mean that consumers would be assumed to buy cars which they would not buy.

I have asked the witnesses to compare their estimates of fuel economy to the targets set in the Bryan bill.

The Secretary of Energy and the Secretary of Transportation expressed their opposition to the Bryan bill in a letter sent yesterday to the chairman of the Commerce Committee. I will submit that letter for the record.

[The letter referred to follows:]

THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

March 18, 1991

The Honorable Ernest F. Hollings
Chairman, Committee on Commerce,
  Science, and Transportation
United States Senate
Washington, D.C. 20510-6125

Dear Mr. Chairman:

We wish to take this opportunity to once again express the Administration's concerns over the bill sponsored by Senator Bryan and others (S. 279) that would substantially increase the corporate average fuel economy (CAFE) requirements for cars and light trucks sold in the United States. We understand that your Committee is preparing to consider the bill shortly. The legislation is very similar to the bill Senator Bryan proposed last Congress (S. 1224). It would increase fuel economy levels for the new car fleet, on a percentage basis, to about 40 mpg by the end of the decade.

The Administration strongly opposed S. 1224 last Congress because of concern for its adverse effects on highway safety, on American workers and on American consumers. Because S. 279 does not differ materially from last year's bill, we continue to oppose the legislation. Indeed, were S. 279 to pass in its current form, the President's senior advisers would recommend that the President veto the bill. Requirements for future fuel economy improvement on the order of that required by S. 279 would require substantial reduction in vehicle size and weight. We believe this major downsizing would have an adverse impact on the safety of the occupants. Benefits gained by recent safety initiatives targeted at improving the safety of light duty vehicles could be compromised, or lost. In our view, it would be a tragic mistake to enact legislation that would undermine this country's progress in highway safety.

As you know, the Department of Transportation has commissioned a major study by the National Academy of Sciences (NAS) to determine what level of fuel economy improvement in the next decade is feasible. The NAS study will address not only what can be accomplished technologically, but also the rate at which those technologies can be introduced, the safety implications, the economic effects on the industry, the marketability of new vehicles, and the effects of future regulatory requirements. The second phase of the study will analyze how to overcome any barriers identified. We expect results from that study to be available later this year.

An important part of the recently released National Energy Strategy (NES) is its emphasis on alternate transportation fuels and technology. The NES initiatives are aimed at substantially reducing the transportation sector's near total reliance on oil, and at improving air quality. We estimate that the clean fuels program included in the Clean Air Act Amendments and the National Energy Strategy alternative fuels/technology initiatives will reduce projected oil consumption by about 3.4 million barrels per day in 2010. In contrast, we estimate that the 40 percent increase in new car fuel economy mandated by S. 279 could result in no more than a one million barrels per day saving in petroleum consumption by 2010, and at a much higher cost per barrel saved.

The fuel economy goals mandated by S. 279 are based on estimates of potential manufacturer fuel economy achievement that were deemed infeasible a year ago and have been made even more so by the additional demands of the new automotive emissions requirements of the recent Clean Air Act Amendments as well as by new safety requirements (such as dynamic side impact requirements for passenger cars). The automotive industry, collectively or separately, will be unable to achieve a 40 percent improvement in fuel economy by 2001 without substantially downsizing the cars it produces. Sales of motor vehicles have already declined significantly. If the manufacturers are forced to offer products unacceptable to the buying public, sales would plummet further with disastrous results for the firms, their workers and the national economy. Moreover, if older, less efficient cars are not replaced by newer, more efficient automobiles, energy conservation and anti-pollution efforts will suffer. Furthermore, as the agency responsible for administering the current CAFE program, the Department of Transportation believes it is essential that the flaws of the current CAFE law not be locked into future fuel conservation programs and legislation.

The market already offers a wide range of vehicles with fuel efficiency ratings of 30 to 50 mpg. Drastic increases in CAFE standards would radically curtail the choice of new vehicles available to American consumers. The earliest model year that could be affected by new CAFE standards in 1995 or 1996. Thus, there is no need for precipitous action. We urge you not to act hastily to pass legislation that offers dubious benefits and the certainty of higher consumer costs. We believe that it is essential to await the results of the NAS study before proceeding with further consideration of fuel economy regulation. It will provide additional information and guidance for a future fuel economy program better suited to the Nation's needs.

The Administration therefore remains strongly opposed to S. 279. Indeed, were S. 279 to pass, the President's senior advisers would recommend that the President veto the bill. Significant energy and environmental benefits would accrue to the nation if Congress were to enact the President's proposal for alternative fuel vehicles contained in the NES.

The Office of Management and Budget advises that, from the standpoint of the Administration's program, there is no objection to the submission of this report.

Sincerely,

Samuel K. Skinner
Samuel K. Skinner
Secretary of Transportation

Jam D Watk
James D. Watkins
Secretary of Energy

The **Chairman**. We have two panels of expert witnesses today which will give us a lively and informative session this morning.

Before we get into the panels I would like to call on Senator Wallop for his comments.

STATEMENT OF HON. MALCOLM WALLOP, U.S. SENATOR FROM WYOMING

Senator **Wallop**. Thank you, Mr. Chairman, good morning.

I would say I think this is an important hearing. As I stated at our February 28th hearing, all Americans have come to expect a high standard of mobility and diversity of transportation choices which must be maintained if we are to retain economic vitality. This requirement has to guide our choices when dealing with these fuel economy issues.

Since the mid-1970's, mandatory fuel efficiency standards have resulted in significant energy savings. However, when world oil prices collapsed in real terms to a 34-year low in 1988, the price signal to new car buyers was that fuel was cheap and plentiful and that they could act accordingly, including driving more.

Prudence would dictate that we get back to the road towards energy efficiency. While this objective is most economically accomplished through the market rather than by regulation, the goal is more easily stated than accomplished.

Our approach in S. 341 is to achieve a more equitable approach that current law for the regulation of automobile fuel economies. In my view, the only meritorious aspect of the CAFE provision in S. 341 is that it is preferable to that taken by Senator Bryan in his proposal. I would much prefer personally a more market-oriented approach.

There are several objectives of this provision. First, they are intended to provide for more flexibility in meeting whatever energy standards are set. And second, the standards are based on what is technologically feasible, rather than on some utopian requirement based on the dreams of another world or the desire to use regulations rather than market incentives to force technology innovation. And, third, the standards are to reflect concern for highway safety.

And I would add a fourth, that what we are seeking to avoid here, and should try our darndest to avoid, is having some Americans control the lives of other Americans through artificial standards. And I think that is what is genuinely on the minds of those who would propose the standards in the Bryan act.

Mr. Chairman, I would ask unanimous consent that my prepared statement be inserted in the record so that we might get on with the hearing.

The **Chairman**. Without objection.

[The prepared statement of Senator Wallop follows:]

Statement of
Senator Malcolm Wallop (R-WY)
Ranking Republican Member
Senate Committee on Energy and Natural Resources
March 20, 1991 (9:30 a.m.)

Corporate Average Fuel Economy provisions of the Energy Security Act of 1991

Mr. Chairman, as I stated at our February 28th hearing, "all Americans have come to expect a high standard of mobility and a diversity of transportation choices which must be maintained if we are to retain our economic vitality." This requirement must guide our choices when dealing with automobile fuel economy issues.

Since the mid 1970's mandatory fuel efficiency standards have resulted in significant energy savings. However, when world oil prices collapsed in real terms to a 34-year low in 1988, the price signal to new-car buyer was that fuel was cheap and plentiful and they could act accordingly, including driving more. But prudence now dictates that we must get back on the "energy efficiency" road. While this objective is most economically accomplished by market mechanisms than by regulation; this goal is much easier stated than accomplished.

Our approach in S. 341 is to achieve a more equitable approach than current law for the regulation of automobile fuel economy. In my view, the only meritorious aspect of the CAFE provision in S. 341 is that it is preferable to that taken by Senator Bryan in his proposal. I would much prefer a more market-oriented approach. The objectives of this provisions are several:

First, the provisions are intended to provide for more flexibility in meeting whatever energy efficiency standards are set;

Second, the standards are based on what is technologically feasible, rather than on some utopian requirement based on dreams of another world or a desire to use regulations, rather than market incentives to force technology innovation; and

Third, the standards are to reflect concern for highway safety.

Our earlier hearing on S. 341 stimulated a detailed discussion of the issues. I am pleased that we are able to pursue this matter further with today's witnesses.

I am concern about the assumptions that are being made by the witnesses in deciding what is, and is not, technically feasible. Automobile manufacturers are faced with compliance with both the Tier I and Tier II emission controls under the 1990 Clean Air Act Amendments. In addition, they are faced with the possibility that other states will opt into the California clean vehicle program, thus changing their production estimates for conventional gasoline vehicles. All of these possibilities must be considered in their planning.

The assumptions of our witnesses regarding these factor significantly effects the outcome of this debate and whether the Congress is equipped to render an equitable decision on what technologies may, or may not, be technically feasible. Frankly, I don't think that the Congress is equipped to make such a decision and the approach taken in S. 341 is preferable to current law and other approaches pending before the Congress.

Ultimately a cost-effective approach to automobile energy efficiency must be found that does not compromise highway safety or reduce the high standard of mobility which all Americans rely on for the movement of people, goods and services.

Thank you Mr. Chairman.

The **Chairman**. We begin today with Steven Plotkin, whom we heard from last week and who is Senior Associate at the Office of Technology Assessment. He is accompanied by Mr. K.G. Duleep of the Energy and Environmental Analysis Inc.

Gentlemen, welcome. We look forward to your testimony.

STATEMENT OF STEVEN E. PLOTKIN, SENIOR ASSOCIATE, OFFICE OF TECHNOLOGY ASSESSMENT, ACCOMPANIED BY K.G. DULEEP, DIRECTOR OF ENGINEERING, ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

Mr. **Plotkin**. Thank you, Mr. Chairman.

Mr. Chairman and members of the committee, thank you for again inviting OTA to discuss with you our completed and ongoing work on automobile fuel economy.

As in my previous testimony on February 28th, I am pleased to be accompanied by Mr. K.G. Duleep, who is director of engineering for Energy and Environmental Analysis or EEA.

I would like to submit my written testimony for the record and summarize it here.

Mr. Duleep will follow me with testimony that will put some flesh on the rather dry numbers that I will talk about here.

Before I discuss our results, I would like to discuss the reliability of our fuel economy projections. We have relied heavily for our quantitative projections on Mr. Duleep's work at EEA.

We have had this work reviewed extensively, first at an OTA workshop attended by, among others, representatives from Ford, General Motors, Chrysler, Toyota, Nissan, and Volkswagen and next, during our Energy Outlook study and also for our assessment report on global warming, Changing by Degrees.

These reviews combined internal OTA review with formal reviews by an advisory panel and a variety of other outside reviewers.

We will try to reach an even broader range of reviewers for our current study which extends our past work to examine scenarios that are more realistic expressions of policy making concerns, in contrast to the cases that I am going to describe here, which are designed to establish the boundaries of potential fuel economy improvement, rather than to examine realistic policy-driven scenarios.

The EEA estimates and methodology have also been reviewed in various forms outside the OTA process, and I have described these in my written testimony.

Let me run through some of our basic fuel economy projections. The numbers are a bit different than those I have given in the past because they include test adjustment that EPA, the Environmental Protection Agency, would give to each company's actual measured results. In other words, the numbers I will recite can be compared directly to the CAFE standards themselves.

First, the product plan for 1995. This is basically a business as usual case. We assume no new fuel economy standards, no gasoline taxes, no important changes in the car market. Domestically manufactured new car fleet fuel economy will be about 28.3 miles per gallon in this scenario for 1995. And total new car fleet fuel economy will be about 29.2 miles per gallon if we assume a 35 percent import share in that year.

We were asked to estimate——

The CHAIRMAN. That is the product plan that you are talking about? You think that is a realistic estimate of where we would head without this?

Mr. PLOTKIN. That is right. So we are looking at a fleet average of somewhere in the neighborhood of about 29 miles per gallon in the year 1995 if we do nothing, if things continue pretty much as they have been going.

The CHAIRMAN. 29 miles per gallon?

Mr. PLOTKIN. 29 miles per gallon.

The CHAIRMAN. 28.3 miles per gallon in 1996? This is domestic only?

Mr. PLOTKIN. Domestic only, that is right. I am talking about the total fleet. We were asked what would happen to our projections if we used the same criteria as in S. 341, if the size and performance of the new car fleet could somehow be rolled back to 1990 levels.

With the criterion specified in S. 341, the new car fleet economy would be about 30.2 miles per gallon, about 1 mile per gallon higher than the product plan that I have described. Note that I am saying nothing here about whether a roll back to 1990 size and performance levels is achievable in this time frame.

There is not a great deal of time between now and 1995 for manufacturers to make important changes to their product plans. However, the companies are not without some degree of flexibility in this time frame since they must be prepared to respond to changes in consumer preferences or unforeseen consumer responses to new product introductions. Further, OTA believes that the fuel economy penalty associated with new emission and safety standards might be reduced if fuel economy standards became a critical constraint.

Consequently, we believe that Congress could realistically set a 1995 fuel economy goal for the total U.S. fleet about 1 mile per gallon higher than the EEA product plan value of 29.2 miles per gallon. Further, the companies can get credits worth over 1 mile per gallon by producing large numbers of flexible fuel vehicles.

I would like to compare these results, about 30 miles per gallon or 31 miles per gallon with alternate fuel credits, to the fuel economy required by S. 279, which is Senator Bryan's proposal. S. 279 requires a 20 percent improvement over a 1988 baseline, or about 34 miles per gallon for the entire fleet. By the year 1996, to bridge the gap between 30 or 31 miles per gallon in our estimates and 34 miles per gallon as required by the Bryan bill would require successful marketing strategies or public policies designed to shift consumer buying habits towards lighter, more efficient, slower-accelerating vehicles in each company's fleet.

The CHAIRMAN. Repeat that.

Mr. PLOTKIN. What I am saying here is, if you wanted to bridge the gap between what we say is likely in the year 1995——

The CHAIRMAN. The product plan.

Mr. PLOTKIN. Versus the 34 miles per gallon required by the Bryan bill, you would have to find some way to get consumers to change their buying habits, as you said in your introduction.

Senator **Conrad**. Mr. Chairman, might I just clear up—in looking at the charts I get confused. How do you get from 28.3, or 29.3, to 31? You use the number 31.

Mr. **Plotkin**. Well, first what I am doing is basically two things. I start with a 29.2-mile-per-gallon total fleet fuel economy. This 28.3 is for domestics.

The **Chairman**. You understand, this is domestics.

Senator **Conrad**. I understand that part.

Mr. **Plotkin**. That is basically assuming you do absolutely nothing. You just let the companies continue along the path they are going. I am assuming that about 1 mile per gallon is available to the companies if they are forced to take whatever action is possible in this time frame.

They can restrict engine lines, they can move to slightly smaller engines, which they have, off the shelf. They have a very limited period of time in which to do this, but they have some small degree of flexibility that brings us up around the 30-mile-per-gallon mark. Then they can use alternative fuel credits to get to 31.

That would not be the actual fleet fuel economy, that would be the CAFE number they could achieve if they produced large numbers of flexible fuel vehicles. That is, they can get up to 1.2 miles per gallon CAFE credit by producing a great number of these vehicles. That is how we get the 31.

The **Chairman**. Now, max technology is defined in the hand-out. For the benefit of Senators, would you explain what max tech is, and whether it is really achievable?

Mr. **Plotkin**. Well, in this particular case, the max tech in the year 2001 is easy to explain. It is basically piling on all the technology that is available in this time frame that is currently in at least one model in the fleet.

That is, it does not assume that we are going to move entirely new technologies into the fleet, but it basically says let us not worry about cost, let us not worry too much about retiring models too early, and let us just do everything we can possibly do in this time frame to improve fuel economy.

The **Chairman**. It assumes 100-percent deployment of every technology that is now deployed in at least one automobile, whether or not they are employed are all automobiles.

Mr. **Plotkin**. It is 100 percent of what could possibly be done. There are some instances where there are some technologies that do not make sense on certain models, so you would not do it 100 percent in every single automobile, but it is basically everything you could possibly do in this time frame—sort of, damn the torpedoes.

The **Chairman**. While we are on this, is maximum tech practical?

Mr. **Plotkin**. It is a hard question to answer, because the word "practical" is not a well-defined term. It can be done. It is going to be expensive for the companies. It is going to require them to retire models before they would like to.

We have got to consider that a new car model might cost $1 billion to basically get from the initial design all the way to production. Somehow, that money must be recouped. If it is normally recovered over an 8-year time frame, and you only give the companies 5 or 6, they could run into trouble, obviously. So there are some real problems here.

On the other hand, as I will discuss later, there are ways to get that fuel economy by a slightly different path that might be considered practical, but it is hard to tell right now because it involves, for example, technologies that are not commercialized yet.

With the 2001 time frame, there may be enough time to bring, for example, a two-stroke engine into at least part of the fleet. That would help you get to the max tech numbers without actually doing the max tech scenario, putting every single technology in, so it is conceivable that you could get to this high number, but to say that it is practical to go this route is a difficult thing to say.

Let me move to the year 2001. We have two basic scenarios: product plan as before, and a maximum technology case driven by strong regulatory pressures to improve fuel economy with little regard to technology costs. Under the product plan, the domestic fleet fuel economy is 31.9 miles per gallon, and the total fleet fuel economy is about 33.4 miles per gallon.

The max tech plan represents a major industry shift in direction. A 37.2 miles per gallon domestic fleet fuel economy, and 38.4 miles per gallon total fleet fuel economy is achieved by returning size, distribution, and performance to the levels of the 1987 new car fleet, introducing technologies that would pay for themselves only by looking at gasoline prices over $2 a gallon.

The **Chairman**. Over how much?

Mr. **Plotkin**. $2 a gallon, and abandoning product lines well before their normal replacement times.

Alternatively, if the size and performance roll back were only to 1990 levels, the appropriate criterion for S. 341, the max tech fuel economy levels would be closer to 36 miles per gallon for the domestic fleet and 37 for the total fleet.

Unless consumer demand shifts strongly to more efficient automobiles, this max tech plan could cause significant economic disruption to the industry not dissimilar to the industry adjustments of the early 1980's.

If the marketplace itself does not change, and if no brand-new technologies are available to enter the fleet by the end of the 1990's, the product plan and max tech scenarios represent extremes. At the one hand, the product plan, a future with no changes from pre-Mideast crisis trends, probably an unacceptable outcome considering today's oil supply situation, and at the other end, an outcome representing a major disruption to industry product planning.

What might be considered a practical technological potential under existing market conditions and using only existing technology probably lies somewhere between these two extremes. However, as I mentioned before, the max tech fuel economy levels would not necessarily seem extreme if buyer preferences shifted towards higher fuel economy. Even moderate shifts in buyer preference for fuel economy and size class can have a large effect on fleet fuel economy.

Also, there is the potential for new technology to penetrate the fleet by 2001. If new technologies can enter the fleet in this time frame, the max technology level of fuel economy might be achievable at lower cost and market risk than would be the case if only current technology were available.

How do our max tech levels compare to Senator Bryan's S. 279 levels? S. 279 requires a 40-percent improvement over a 1988 baseline for about 40 miles per gallon for the total U.S. auto fleet by 2001. Although this is greater than the 38-mile-per-gallon value for our max tech case, the values are not truly comparable in this time frame.

Aside from the uncertain potential for new technology that was not considered in our max tech case, auto makers can gain substantial fuel economy credits in this time frame by manufacturing both flexible fuel and dedicated alternative fuel vehicles. Thus, they may be able to comply with a 40-mile-per-gallon standard without actually attaining a true 40-mile-per-gallon fleet average fuel economy. We hope to better quantify this potential in our on-going study.

What about S. 341? We have shown what the estimated fuel economy values would be if they were adjusted to 1990 levels of size and performance—that is, about 37 miles per gallon for the fleet. The EEA analysis satisfies some of S. 341's requirements for calculating that maximum fuel economy technological feasibility, since all technologies considered in our analysis to 2001 already have been commercialized, and we assume attainment of all applicable emission and safety standards.

But our max tech assumptions may be more conservative than required by S. 341, because S. 341 asks that all fuel-saving technologies and designs be included that are capable of being commercialized by the appropriate period, whereas our analysis incorporates only technologies that have already been commercialized. Thus, drive-by-wire technology, two-stroke engines, and other technologies that could be commercialized by 2001 are not included in our analysis.

But on the other hand, some of S. 341's limitations on the maximum fuel economy—for example, the required consideration of financial and marketing limitations—conceivably could disqualify technologies such as variable valve timing, which are included in our analysis. That is, we really cannot tell whether our analysis is more or less conservative than what would be required under S. 341 because the language simply is not precise enough.

I would like to reiterate here that the maximum technology scenario was meant to show only what could be achieved by applying essentially all currently used technology to the maximum extent possible regardless of costs. I have discussed in my written testimony what the costs and risks are for such a scenario.

Briefly, the maximum technology scenario will force auto makers to abandon car models in advance of schedule, and this is going to mean that the last few years of the model run will not be available in which to recover the initial costs of designing and tooling up for these models. Also, the need to redesign all car lines in a short period of time could put a strain on the engineering capabilities of the industry. The risk is greater for the domestics than for the Japanese, because many of the Japanese auto makers have a shorter product cycle.

The CHAIRMAN. Our product cycle is about 8 years on the average?

Mr. PLOTKIN. Yes.

The CHAIRMAN. The Japanese are how long?

Mr. DULEEP. Four years.

Mr. PLOTKIN. I would like to add one closing remark. We in the analytical community have been mostly reacting to congressional initiatives in structuring our analyses—that is, trying to evaluate existing legislative proposals rather than suggesting alternatives to such proposals.

In my previous testimony, I made some small attempts to promote some thinking in alternative directions, namely, the idea of looking at alternative regulatory structures such as volume average standards and the value of designing goals for the years between the compliance years, in particular, the idea of requiring only one or two models in each auto makers fleet to demonstrate high fuel economy designs in these interim years.

I would like to contribute one added thought about alternatives. Our analyses have shown that the increments of fleet fuel economy attainable in the 1995 and 1996 time frame are really quite modest, and I suspect that the gathering congressional momentum is in the direction of a modest initial standard for this time frame and a tougher one for 2001.

Perhaps we should be asking a different question. Is 1996 really the best date for the first of a set of new CAFE standards? It seems to me that we should be examining the pros and cons of alternative target dates. For example, comparing the proposed 1996-2001 set of dates to perhaps a 1998 and 2003 set of dates, or some other combination. I am disturbed that we appear to have locked onto a set of dates without sufficient thought going into their selection.

Mr. Chairman, this completes my testimony. Thank you.

[The prepared statement of Mr. Plotkin follows:]

TESTIMONY OF STEVEN E. PLOTKIN, SENIOR ASSOCIATE
OFFICE OF TECHNOLOGY ASSESSMENT
before the
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
March 20, 1991

ESTIMATING FEASIBLE LEVELS OF CORPORATE AVERAGE FUEL ECONOMY

Mr. Chairman and Members of the Committee, thank you for again inviting OTA to discuss with you our completed and ongoing work on automobile fuel economy. As in my previous testimony on February 28th, I am pleased to be accompanied by Mr. K.G. Duleep, DDirector of Engineering for Energy and Environmental Analysis, Inc., who is assisting us with this work.

Aside from work completed a decade ago, OTA first examined the issue of improving automobile fuel economy for our Energy Outlook study, conducted for the Energy and Commerce Committee. We are now examining the issue in more detail at your request, Mr. Chairman. In our current work, which we hope to publish within a few months, we are examining fuel economy potential in a realistic policy-driven environment, that is, we are trying to define fuel economy values that could serve as realistic CAFE standards. We also are examining the effects on fleet fuel economy of changes in consumer preferences, which we did not do in our earlier work. Our earlier work instead focused on defining two cases for future fuel economy: a "lower bound" fuel economy in the absence of any new policies or large oil price increases and, as an alternative, a higher fuel economy scenario that set no explicit limits on technology costs (though some technologies were not allowed in the model because of very high costs) and that assumed that size and performance were rolled back to levels corresponding to the 1987 new car fleet. We recognize that the higher case was not a true upper bound because it didn't allow for entirely new technologies by the target year (2001) nor did it allow for significant shifts in consumer preferences for efficiency, size, and performance.

I will restrict my remarks at this time to the results of our earlier work, which has undergone our review process. Before discussing our results, however, I would like to briefly describe the methodology and review process that underpins both these results and our forthcoming report.

Methodology

OTA has relied heavily for its quantitative estimates of potential future fuel economy on analyses conducted by Energy and Environmental Analysis, Inc. (EEA), an Arlington, Virginia-based consulting firm. EEA's work has been developed over a number of years, supported primarily by the U.S. Department of Energy. Mr. Duleep has been the principal investigator for this work.

EEA's methodology first specifies a baseline of fuel economy and vehicle technology attributes. For each vehicle type, EEA has identified individual fuel economy technologies applicable to that type and the fuel economy benefits associated with each technology.[1] The methodology then adopts these technologies and calculates total fuel economy benefits subject to constraints about synergism between technologies and the non-additive nature of certain types of benefits. The selection of the technologies is also subject to a variety of assumptions adopted by the client, including rules defining cost-effectiveness (discount rates, number of years of fuel savings counted in the analysis). For the near-term (1995), announced company product plans are used to define minimum technology improvements associated with major subsystems. As a last step, the estimates of total fuel economy benefits are adjusted to account for expected changes in weight and performance of the fleet, and changes in emissions and safety standards.

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[1] The fuel economy benefits are calculated at constant performance and interior volume. This is necessary because technologies that can increase fuel economy can instead be used to increase performance and/or interior volume with lesser or no improvement in fuel economy, if the vehicle designer so desires.

EEA's list of technologies and fuel economy benefits was compiled using data from research papers, actual benefits from vehicles already featuring the technology, manufacturer submissions to the Department of Transportation, and in some cases information supplied directly from the manufacturers themselves. The EEA estimates of individual technology benefits have been extensively discussed with the domestic manufacturers and some of the foreign manufacturers as well, and EEA has revised some of their individual estimates on the basis of manufacturer comments.

OTA has subjected the EEA results to our internal and external review process. EEA's initial work for OTA was first presented and reviewed in an OTA workshop attended by, among others, representatives from Ford, General Motors, Chrysler, Toyota, Nissan, and Volkswagen. Both the EEA draft report and an OTA draft chapter based on that report was reviewed during our Energy Outlook study; more recent work was also reviewed for our assessment report on Global Warming, *Changing by Degrees*. These reviews combine internal OTA review with formal reviews by an Advisory Panel (the global warming transportation panel included representatives from General Motors and Ford) and a variety of other outside reviewers. We will try to reach an even broader range of reviewers for our current study.

The EEA estimates and methodology have also been reviewed in various fora outside the OTA process. First, the results and methodology have been presented, discussed, and debated in Society of Automotive Engineering and other forums numerous times over the past few years. Second, as noted above, EEA has discussed the estimates and methodology with the domestic manufacturers. For example, I was present at an all-day meeting between EEA and a team of automotive engineers from the three domestic automakers on January 17 of last year, in which Mr. Duleep discussed the EEA technology-by-technology projections, its methodology, and its resulting fuel economy projections. The discussion and critique was monitored by analysts from the Department of Energy, Department of Transportation, and Environmental Protection Agency as well as myself.

Results and Comparisons to S. 279, Senator Bryan's Fuel Economy Proposal

In the discussion that follows, the fuel economy results presented are "adjusted" EPA values -- the mpg values that can be compared directly with required CAFE standards. The values are derived by first estimating the likely physical results from the EPA test procedure, and then adding a testing adjustment that would be assigned by EPA to each automaker's results. The estimated adjustment is about +.3 mpg in 1995 and +.4 mpg in 2001. OTA's previous testimony did not include this adjustment. Its inclusion here allows these values to be compared directly to the fuel economy values required by current and future CAFE standards.

Also, for both 1995 and 2001, we have shown what the estimated fuel economy values would be if adjusted to 1990 levels of size and performance, the conditions established by S.341 for determining "maximum feasible average fuel economy (MFAFE)." The EEA/OTA analysis satisfies other *specific* requirements under S.341 for calculating MFAFE: technological feasibility (all technologies considered in our analysis to 2001 already have been commercialized); and attainment of all applicable emission and safety standards.

The EEA/OTA technology criteria may differ from some of the qualitative conditions for calculating MFAFE set forth in S.341, though it is difficult to be sure. For example, our analysis may be more conservative than required by S.341 because the proposed legislation asks that "all fuel-saving technologies and designs (be included) that *are capable* (our emphasis) of being commercialized by the appropriate period," whereas our analysis incorporates *only* technologies that have *already* been commercialized. Thus, drive-by-wire technology, engine stop/start, energy storage systems, and other technologies that *could* be commercialized by 2001 are not included in our analysis. On the other hand, some of the S.341's limitations on MFAFE, for example the required consideration of "financial and marketing limitations," conceivably could disqualify technologies such as variable valve timing which *are* included in our analysis.

Table 1 provides EEA's projections for 1995 domestic new car fleet fuel economy for the lower bound, "product plan" case, assuming continuation of current trends in increasing vehicle size and performance, application of expected emissions and safety standards, and no new fuel economy standards. In other words, in 1995:

- With no new fuel economy regulations or other new policies that could alter fuel economy (e.g., gasoline taxes), and no significant changes in market forces, domestically manufactured new car fleet fuel economy will be about 28.3 mpg. The import car fleet will be about 31.1 mpg. Total new car fleet fuel economy will be about 29.2 mpg assuming a 35 percent import share. We note that the values for the domestic fleet will change if imports capture more market share in the smaller car sizes.
- If the size and performance of the new car fleet could somehow be rolled back to 1990 levels -- the criterion specified in S.341 -- the domestic/total new car fleet fuel economies would be about 29.3/30.2 mpg. *Note that this is a theoretical case to show the effects of actual and expected market changes between 1990 and 1995.*

There is not a great deal of time between now and 1995 for manufacturers to make important changes to their product plans. EEA has not developed a "maximum technology plan" -- a scenario that assumes significantly greater penetration of fuel economy technologies -- for the 1995 date, because it feels that significant increases in technology penetration are not realistic for this early date. However, the companies are not without some degree of flexibility in this time frame, since they must be prepared to respond to rapid changes in consumer preferences or unforeseen consumer responses to new product introductions. Further, OTA believes that the fuel economy penalty associated with new emission and safety standards is dependent in part on

TABLE 1A

REVISED PROJECTION

U.S. DOMESTIC MANUFACTURERS

1995 PRODUCT PLAN CASE

(Does not include test adjustments)

Technology	F/E Gain (%)	Penetration Increase from 1987 (%)	1995 (%) Penetration	Fleet (% F/E Gain
Front Wheel Drive	10.0	12	86	1.20
Drag Reduction (C_D -0.33)	2.3/4.6**	65/15	-100	2.19
4-speed Automatic Transmission	4.5	40	80	1.80
Torque Converter Lock-up	3.0	20	80	0.60
Electronic Transmission Control	0.5	80	80	0.40
Accessory Improvements	0.5	80	N/M	0.40
Lubricant/Tire Improvements	1.0	100	100	1.00
Engine Improvements				
- Advanced Pushrod	3.0	(40)	(30)	1.20
- Overhead Camshaft	3.0	45	69	1.35
- Roller Cam Followers	2.0	40	95	0.80
- Low Friction Pistons/Rings	2.0	80	100	1.60
- Throttle Body FI	3.0	12	40	0.36
- Multi-point FI (over throttle body)	3.0	12	60	0.36
4 valves per cylinder engine				
- 4 cylinder replacing 6*	8.0	180	18	1.44
- 6 cylinder replacing 8*	8.0	120	12	0.96
Total F/E Benefit				15.66 %

* 1987 distribution: 20.5% V-8, 29.5% V-6, 50% 4 cylinder

** Drag reduction for large/luxury cars from C_D = 0.42 baseline.

TABLE 1B

1995
IMPORT MANUFACTURERS
FUEL ECONOMY

(FIVE LARGEST JAPANESE MANUFACTURERS ONLY)

(Does not include test adjustments)

Technology	F/E Gain (%)	Penetration Increase from 1988 (%)	1995 (%) Penetration	Fleet (%) F/E Gain
Front Wheel Drive	10.0	3	90	0.30
Drag Reduction I	2.3	80	-100	1.84
4-speed Auto. Trans.	4.5	16	47	0.72
Torque Converter LU	3.0	9	53	0.27
Elec. Trans. Control	0.5	44	47	0.22
Accessory Improvements	0.5	80	N/M	0.40
Tires/Lubricants	1.0	100	100	1.00
Roller Cam Followers	2.0	50	50	1.00
Low Friction Piston/Rings	2.0	80	100	1.60
Throttle Body FI**	2.0	25	20	0.50
Multi-Point FI	3.0	20	75	0.60
4 Valves/Cylinder	5.0	20	44*	1.00
TOTAL F/E BENEFIT (%)				7.85 %

* Additional 6 percent are 3-valve/cylinder.

** Benefit of TBI is lower than for domestic cars because air pumps are not used in carburetted import cars.

which compliance strategies are selected, and could be reduced below a "business as usual" value (about .8 mpg) if fuel economy standards become a critical constraint. Consequently, we believe that Congress could realistically set a 1995 fuel economy goal for the total U.S. fleet somewhat higher -- perhaps an additional 1 mpg higher -- than the EEA "product plan" value of 29.3 mpg. Further, the companies can achieve fuel economy credits for producing alternative fuel vehicles; they can raise their official CAFEs by over 1 mpg by producing large numbers of these vehicles.

S. 279, which is Senator Bryan's proposal, requires a 20 percent improvement over a 1988 baseline, or about 34 mpg for the entire fleet, by 1996. In attempting to meet S.279's requirements, the companies could accelerate production of flexible fuel vehicles, presumably selling them by pricing them no higher than single-fuel vehicles, and could take a number of other strategic steps such as restricting some engine lines. OTA has not attempted a formal estimate of the potential results of such a strategy, but we suspect that the industry might thereby be able to obtain an overall fleet CAFE rating of perhaps 31 mpg or a bit higher (including a 1.2 mpg credit for the flexfuel vehicles) by 1996. Moving the remainder of the distance to the CAFE goal would require successful marketing strategies and/or public policies designed to shift consumer buying habits towards the lighter, more efficient, slower accelerating vehicles in each company's fleet.

Table 2 presents EEA's projections for the year 2001 domestic fleet under two scenarios: a "product plan" under which the industry installs technology at a rate that makes economic sense from a purely market-driven perspective,[2]

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[2] This scenario is constructed by using published product plans to identify the major technology groupings to be used by each manufacturer, and a "cost-effectiveness" criterion for the other technologies.

TABLE 2

REVISED PROJECTION
POTENTIAL U.S. FUEL ECONOMY IN 2001 UNDER ALTERNATIVE SCENARIOS

(Does not include test adjustments)

	Fuel Economy Benefit (%)	Product Plan		Max. Technology	
		Mkt. Pen 1995 - 2001 (%)	F/E Gain	Mkt. Pen 1995 - 2001 (%)	F/E Gain
Weight Reduction	3.3/6.6	100	3.30	100	5.28
Drag Reduction	1.15/2.3	80	0.92	80	1.84
Intake Valve Control[1/]	6.0	30	1.80	70	4.20
Overhead Cam Engines	3.6	30	.09	30	.90
6 cyl./4V replacing 8 cyl.	8.0	4	0.32	8	0.64
4 cyl./4V replacing 6 cyl.	8.0	6	0.48	12	0.96
4 cyl./4V replacing 4 cyl.	5.0	20	0.50	50	2.50
Multi-point fuel injection (over TBI)	3.0	40	1.20	40	1.20
Front wheel drive	10.0	5	0.50	13	1.30
5-speed auto. transmission*	2.5	20	0.50	40	1.00
Continuously variable transmission*	2.5	20	0.50	40	1.00
Advanced engine friction reduction	2.0	100	2.00	100	2.00
Electric Power Steering	1.0	5	0.05	30	0.30
Tire Improvements	0.5	20	0.10	100	0.50
Total F/E Benefit (%)			12.47[1/] %		22.22[1/] %
Unadjusted CAFE (MPG)			31.5 mpg		36.8 mpg

Note: Product plan scenario starts from a different 1995 base than the maximum technology scenario which holds performance and size constant at 1987 levels.

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* Over 4-speed auto transmission with lock-up.

[1/] Synergy of intake valve control with 5-speed/CVT transmissions results in a loss of 2 percent in fuel economy.

TABLE 2B

IMPORT MANUFACTURERS
FUEL ECONOMY IN 2001

(FIVE LARGEST JAPANESE MANUFACTURERS ONLY)

(Does not include test adjustments)

Technology	F/E Benefit (%)	Product Plan (%)		Maximum Technology (%)	
		Mkt. Pen.	F/E Gain	Mkt. Pen.	F/E Gain
Weight Reduction	3.3/6.6	90	2.97	90	5.94
Drag Reduction	1.15/2.3	80	0.92	80	1.84
Intake Valve Control*	6.0	30	1.80	60	3.60
4-Valve Engine	5.0	10	0.50	50	2.50
Multi-point FI	3.0	25	0.75	0	0.00
Front Wheel Drive	10.0	0	0.00	5	0.50
5-Speed Auto. Trans.	2.5	6	0.15	12	0.30
CVT	3.5	26	0.91	40	1.40
Advanced Friction Reduction	2.0	100	2.00	100	2.00
Electric Power Steering	1.0	10	0.10	35	0.35
Tire Improvements	0.5	100	0.50	100	0.50
TOTAL F/E BENEFIT (%)			10.60 %		18.43*
2001 MPG			34.1 mpg		39.5 m

* Synergy with 5-spd auto-transmission/CVT results in 2 percent loss in F/E when both technologies are used in the same vehicle.

TABLE 1C

1995 PRODUCT PLAN
U.S. DOMESTIC LDV FLEET

(Does not include test adjustments)

1987 Fuel Economy:	26.7 MPG
1995 Fuel Economy w/o size or peformance increase	30.9 MPG
Size/weight Increase	-1.4 MPG
Performance Increase	-0.7 MPG
Effect of Emission/Safety Standards	-0.8 MPG
1995 Product Plan F/E	28.0 MPG

TABLE 1D

1995
IMPORT MANUFACTURERS
FUEL ECONOMY

(Does not include test adjustments)

1988 Fuel Economy	31.4 MPG
1995 Fuel Economy without size or performance increase	33.86 MPG
Size/Weight increase	-1.20 MPG
Performance Increase	-0.90 MPG
Effect of Safety/Emission Std.	-0.94 MPG
1995 Product Plan F/E	30.82 MPG

and a "max technology" case driven by strong regulatory pressures to improve fuel economy with less regard for technology costs. The product plan assumes that the automakers install technologies that pay for themselves through fuel savings in four years (the average time of ownership of a new car's first owner) assuming a 10 percent discount rate and $1.33/gallon (in 1987$) gasoline. The domestic fleet fuel economy of 31.9 mpg (total fleet fuel economy of about 33.4 mpg) obtained under this plan presumes that current increasing trends in fleet size distribution and performance continue only until 1995 and then plateau.

The max technology plan represents a major industry shift in direction. A 37.2 mpg domestic fleet fuel economy (about 38.4 mpg total fleet fuel economy) by 2001 is achieved by returning size distribution and performance to the levels of the 1987 new car fleet; introduction of technologies that would pay for themselves in four years with gasoline valued at $2.50-$3.00/gallon[3] ($1.55-$1.90/gallon for a 10 year payback); and abandonment of product lines well before their normal replacement times. Alternatively, if the size and performance rollback were only to 1990 levels -- the appropriate criterion for S.341 -- the max technology fuel economy levels would be closer to 36 and 37 mpg, respectively, for the domestic and total fleet. Unless consumer demand shifts strongly to more efficient autos, this plan could cause significant economic disruption to the industry, not dissimilar to the industry adjustments of the early 1980s.

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[3] The $3.00 to $3.50/gallon value corresponds roughly to current gasoline prices in much of Europe.

Note that this level of fuel economy can be obtained *only* if each company were required to improve its fuel economy according to the technological potential of its fleet; a uniform standard such as the current CAFE-type standard cannot achieve a total fleet fuel economy this high, since it must accommodate the fuel economy achievable by the company with the most difficult task among all the companies. This would probably be the company with the largest vehicles, either Ford or GM.

If the marketplace itself does not change, and *if* no brand new technologies are available to enter the fleet by the end of the 1990s,[4] the product plan and max technology scenarios represent extremes: at one end, a future with no changes from pre-mideast crisis trends -- probably an unacceptable outcome considering today's oil situation; and at the other end, an outcome representing a major disruption to industry product planning. What might be considered a practical "technological potential" under existing market conditions and using only existing technology probably lies somewhere between these extremes. However, the max technology scenario would not necessarily seem extreme if buyer preferences shifted towards higher fuel economy. Analysis of the potential effects of moderate shifts in buyer preference for fuel economy and size class demonstrate that such shifts would have a large effect on fleet fuel economy. Also, there is the potential for new technology (that is, technology not now on any model in the fleet) to penetrate the fleet by 2001; if new technologies *can* enter the fleet in this time frame, the "max technology" level of fuel economy might be achievable at lower cost and market risk than would be the case if only current technology were available.

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[4] The year 2001 analysis incorporates only those technologies that currently are installed on at least one commercial car model. Consequently, the analysis is quite conservative; use of new technologies could allow similar improvements in fuel economy to occur under less extreme conditions than the "max tech," or allow even higher levels of fuel economy to occur under max tech assumptions.

S. 279 requires a 40 percent improvement over a 1988 baseline, or about 40 mpg for the total U.S. auto fleet, by 2001. Although this is greater than the 38 mpg value we derive for the max technology case above, the values are not truly comparable in this time frame. Aside from the (uncertain) potential for new technology that was *not* considered in the max technology case, automakers can gain substantial fuel economy credits in this time frame by manufacturing flexible fuel and dedicated alternative fuel vehicles. Thus, they may be able to achieve a 40 mpg "standard" without actually attaining a true 40 mpg fleet average fuel economy. We hope to better quantify this potential in our ongoing study.

OTA's Future Work

In our ongoing work for this Committee, we have tried to define a policy scenario that provides a middle ground between the "business as usual" environment of the product plan scenario and the "use every available technology no matter the cost" environment of the max technology scenario. Ideally, we would have wished to examine a wide range of policy scenarios to give Congress maximum flexibility to pick a scenario, and associated CAFE level, closest in line with their values and concerns. We could not do this within the bounds of our time and financial constraints.

The scenario we did choose is one that attempts to take a societal view of the importance of increasing fleet fuel economy. We considered the fuel savings over a 10 year period (rather than the 4 year/first owner perspective of the product plan scenario) and valued gasoline at $2.00/gallon (1990$) as a proxy for its full societal costs (we recognize that the concept of an "energy security/global warming price premium" for gasoline is controversial, and that different policymakers might apply a different premium depending on their concerns). The other elements of the scenario are:

- application of feasible changes from the product plan to boost fuel economy in 1996, e.g. restricting high performance engine lines, boosting penetration of some kinds of fuel economy technologies;
- relaxation of the "no new technology" assumption that considers only those technologies already in the fleet; instead, we require that the potential be considered that some new technologies might attain enough market penetration by 2002 to make a difference in fleet fuel economy.
- for the 2002 model year, a decline in performance back to 1990 levels for 2002; and,
- application of a series of new technologies and 1990 performance levels in 2010.

We also will examine the effect of shifting the market share of different vehicle size classes within this scenario, to demonstrate the potential effect of changes in consumer preferences.

Moving Towards a "Maximum Technology" Fuel Economy Standard

The costs and risks of any policy that forces the auto industry towards a "maximum technology" requirement standard can be understood in the context of industry cost-structure, product life cycles, and product lead-time requirements.

The auto industry has large fixed costs that it incurs in developing and tooling up for a new model. Currently, many high-sales-volume car models require spending $1 billion prior to the first car being rolled out of production. The automaker hopes to pay off this investment over the life of the model, which typically has averaged about 8 years. Thus, a large part of the "cost" of a new car is the amortization of the initial investment. The automaker must guess the sales volume over the 8-year model life so that he can calculate the required per-car payback of this investment and figure it into the model's price. If the car is more successful than the automaker hoped for, the model line will be very profitable, but if it is less successful, the line will lose money. An automaker with several models will have a "stable" of winners and losers; hopefully, on average, he will realize an adequate return on total investment.

The $1 billion initial cost for a new model is spent over the 5-year period when the model is conceived, developed into a prototype, tested, and certified to all applicable safety and emission standards, and while the manufacturing plant is retooled to build the new model. The 5-year lead time means that the new models for 1996 are now in the detailed planning stage. The 1996 model will then remain in production until about 2004 if the automaker is to obtain the expected return on investment. For engines and transmissions, the lifecycle may be longer -- some current engines date back to the early 1970's, although they have received evolutionary updates.

A maximum technology scenario requires that automakers redesign all of their products applying all available technologies on or before the target year. It is obvious that such a requirement will be meaningless for 1996, because the lead time is insufficient to even redesign all products much less produce them.

If the target year is 2001 or 2002, it is possible *in principle* to redesign all products to include maximum technology. However, this will lead to two significant burdens on the automakers. First, new models that will be introduced in 1994/1995 and cannot be withdrawn at this late stage will have to be phased out a few years before the end of their normal lifecycle. If a model loses two or three years of life, the return on investment to the maker will be significantly reduced.

Second, automakers would now have only 9 or 10 years to redesign all of their products, including models that have just been redesigned, instead of the U.S. industry experience of 13 years. This can be done if the automakers can accelerate the design process by hiring more engineers, increase overtime, or make the design process more efficient. However, shortened lead times could lead to designs that are not fully tested and would be at increased risk of market failure. The risk is less for Japanese automakers, some of whom have reduced their lead time to four years and reduced initial costs to the point that their product life cycle can be four years. However, U.S. automakers have not been able to duplicate this.

The burden associated with an early target year for a standard based on maximum technology requirements may be aggravated by recent Clean Air Act revisions and new safety requirements, which have imposed additional design burdens on all automakers.

The selection of an appropriate target date for a maximum technology scenario involves a tradeoff of the risks and costs associated with accelerated design schedules and lessened product lifetimes and the benefits of moving the fleet more rapidly towards higher fuel economy. For policymakers who are somewhat risk averse, given the current U.S. cycle of 8 year model life and 5 year lead time, and the closeness of the 1992 model year, the 2005 model year might seem a good choice for a target date. A model year 2005 target would lessen risks to U.S. automakers and avoid the costs of prematurely introducing technology across all models on an accelerated schedule. On the other hand, U.S. automakers have successfully accelerated their product schedules in the past, for example during the middle 1970s and early 1980s, and could do so again, though at high costs. Also, there exists some potential that U.S. automakers can achieve the shorter turnaround schedules of some of the Japanese makers. Depending on the value they place on the benefits of accelerating fuel economy improvements, some policymakers might prefer an earlier target date for a maximum technology scenario.

Should the First New Fuel Economy Standard be Scheduled for 1995/96?

I would like to add one closing remark. We in the analytical community have been mostly reacting to congressional initiatives in structuring our analyses, that is, trying to evaluate existing legislative proposals rather than suggesting alternatives to such proposals. In my previous testimony, I made some small attempts to promote some thinking in alternative directions, namely, the idea of looking at alternative regulatory structures such as volume average standards, and the value of designing goals for the years between the compliance years, in particular the idea of requiring one or two models in each automaker's fleet to demonstrate high fuel economy designs in these interim years. I'd now like to contribute one added thought about alternatives. The EEA analyses have shown that the increments to fleet fuel economy attainable in the 1995/1996 time frame are quite modest, and I suspect that the gathering congressional momentum is in the direction of a modest initial standard for this time frame and a tougher one for 2001. Perhaps we should be asking a different question: Is 1996 really the best date for the first of a set of new CAFE standards? It seems to me that we should be examining the pros and cons of alternative target dates, for example comparing the proposed 1996/2001 set to 1998/2003 or other combinations. I'm disturbed that we appear to have locked onto a set of dates without sufficient thought going into their selection.

This completes my testimony.

The CHAIRMAN. Thank you very much, Mr. Plotkin.

Mr. Duleep.

STATEMENT OF K.G. DULEEP, DIRECTOR OF ENGINEER, ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

Mr. DULEEP. Mr. Chairman and members of the committee, thank you for allowing me to testify again on the important issue of fuel economy.

The analysis in my testimony is based on work initiated for the OTA and since updated from various other clients. I would like to take this opportunity to provide the Energy Committee members with a more in-depth look at the technologies behind the projections, as well as the attributes of a car available in 2001 if maximum technology level of fuel economy standards is imposed.

In other words, as Mr. Plotkin said, let us put some flesh on the numbers. The method I have chosen is by picking a popular, current mid-sized car model and tracking all the changes required to get to maximum technology.

I have used the Ford Taurus in this example, as it is a modern, fuel-efficient car that is safe, relatively fuel efficient, and can seat six passengers.

The analysis could easily have selected other comparable cars such as the Buick Century or the Eagle Premier with only slightly different results.

The Ford Taurus is already more efficient than the average domestic car as it incorporates an aerodynamic design, a low friction V-6 engine with multi-point fuel injection and a four-speed automatic transmission. Hence, the percentage increase from a 1990 base in fuel economy will be somewhat lower than the average achievable for the entire fleet.

The particular model used in this example is a Taurus sedan with a three liter V-6, rated at 140 horsepower. It can accelerate from zero to 60 miles per hour in 9.8 seconds, and it has a CAFE rating of 27.4 miles per gallon.

Our analysis of future fuel economy potential traces the possible technological improvements, assuming that first, that new technologies are optimized for fuel economy rather than performance, for example, and that the 2001 vehicle has the same interior room and acceleration performance as the current 1990 vehicle.

The most significant source of fuel economy improvement is through the employment of advanced engine technology. The current 3 liter V-6 is a two valve, push rod-type design. It can be replaced by an overhead cam, 2-liter, four-cylinder engine that has four valves per cylinder, a compression ratio of 10 to 1 and intake valve control.

The engine would actually have a higher horsepower rating at 145, but a slightly lower torque rating. Torque is a better measure of horsepower for low speed performance, which is performance around town, and to compensate for the decreased torque, a higher axle ratio must be used.

The car size is held constant, but the weight is projected to decrease from 3,090 pounds today to 2,810 pounds. Part of this will be due to the engine size reduction. If the new engine is made from aluminum, the engine weight alone will be reduced by 100 pounds.

Another 240 pounds will be reduced from the use of advanced plastics in the front fascia, the fenders, the hood and then the use of aluminum, magnesium and high strength steel alloys in the load-bearing structure of components of the vehicle, as well as a redesign of the structure to capture the secondary benefits.

The 1990 Taurus already has an airbag, but the future side impact requirements and the new emissions will add about 60 pounds to the weight of the car. The car is assumed to meet the tier 1 emission standards mandated in the Clean Air Act, but not the tier 2 emission standards that may be imposed in the post-2000 time frame.

The hypothetical 2001 Taurus would be more aerodynamic, with a drag coefficient of 0.3, which is equal to the best of today's cars. It would use a five-speed automatic transmission, not the manual ones as you mentioned earlier, that is electronically controlled to optimize gear shifts and torque converter lock-up.

The car would also feature improved tires with lower rolling resistance and low friction oil in the crankcase and the drive train.

These technologies will allow the fuel economy to be 35.3 miles per gallon in 2001, according to the EEA estimate, which is a 29 percent improvement over the 1990 car.

The vehicle is forecast to have nearly equal acceleration performance at low speed, and slightly better performance at the high speed. Physically will have the same exterior and interior size, but it will be more sleek in appearance due to the reduced drag coefficient.

EEA believes that the drive quality will be equal to or better than today's Taurus. Moreover, the 2001 car will save 470 gallons of fuel over 50,000 miles, assuming that the on-road MPG is 15 percent lower than the EPA test MPG.

Any forecast involves some degree of uncertainty and we believe the fuel economy forecast is probably accurate to about half, plus, minus half MPG.

It is possible that the technology changes could adversely drivability and maintainability, although I have no reason to suspect that this will happen.

At the same time, I am not suggesting that these changes can be made easily by 2001. The 2001 car as described will require a completely new design for the body, the engine and the transmission, all of which involves substantial capital investment.

On a discounted cash flow basis, gasoline must cost over $2 a gallon for the consumer to recoup the increased first cost of the car over 50,000. Hence, the maximum technology scenario will not be cost effective to the consumer if gasoline is selling at a much lower price than $2 per gallon.

It is important to be aware of these factors when considering MPG targets defined by a maximum technology scenario. I should also note that the technologies described are not the only way to attain 35.3 MPG.

If, for example, the two stroke engine is commercialized by 2001, the car may attain an even higher fuel economy level in 2001 at lower cost.

Some have suggested the threat of increased fatalities if fuel economy is improved. The total forecast weight reduction is not large, and weight is only one of many factors affecting safety.

It is obvious that increasing a car's weight by loading a sack of bricks in the rear seat will not make a car safer. Safety also depends on the materials used, the design of the impact on the energy-absorbing structure, the total length of the car, et cetera.

NHTSA has recently released the results of crash tests on several 1990 models, and the model with the poorest rating was also the heaviest, proving the importance of factors other than weight.

The point here is that today's 2,800 pound car is quite different from the projected hypothetical 2,800 pound Taurus that could be available in 2001, since the future car will be as long as today's Taurus, but will feature greater use of advanced high-strength materials.

Transferring weight-based fatality rates derived from today's cars to a 2001 vehicle is analytically incorrect since the materials used in today's cars are not the same as those hypothesized for the 2001 car.

Lastly, we have considered the impact on the manufacturer. The industry operates on an 8 year product cycle, and the Taurus was first introduced in 1986. Industry analysts expect Ford to introduce a new model Taurus in 1994 or 1995.

It is too late to influence the new model planned for 1994, so that Ford could normally introduce the type of car forecast under the maximum technology scenario only in 2002 or 2003.

By forcing the introduction of the new vehicle on or before 2001, Ford will lose 2 to 3 years of product life, which will result in significant lost revenues for Ford.

Since the capital investment is amortized over an expected sales volume, the reduced product life will negatively impact Ford's profits.

The **Chairman**. Ford's what?

Mr. **Duleep**. Ford's profits.

The **Chairman**. If any.

Mr. **Duleep**. The current 5-year lead time and an 8-year product cycle suggests that 2005 is a better target date, if technology forcing legislation requiring the complete redesign of all products is considered.

In summary, I would like to stress four points. First, the EEA analysis is very detailed, and fuel economy projections are based on extensive technology analysis.

Second, the projections hold vehicle interior volume and acceleration performance at current levels, but consumers may find the cars less desirable in terms of first cost and possibility drivability or maintainability.

Third, the fuel economy projection is based on a maximum technology scenario, requires the complete redesign of the vehicle, body and transmission and the technology utilized will not be cost effective to the consumer unless gasoline prices are over $2 a gallon.

The **Chairman**. In today's prices?

Mr. **Duleep**. In today's dollars.

Fourth, we believe that safety concerns about increased fatality rates due to CAFE may exist, but weight-based fatality rates from current cars cannot be blindly applied to project fatality rates in 2001.

I will be pleased to answer your questions.

[The prepared statement of Mr. Duleep follows:]

TESTIMONY OF K.G. DULEEP
DIRECTOR, ENERGY AND ENVIRONMENTAL ANALYSIS (EEA)
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
March 20, 1991

Mr. Chairman and Members of the Committee, thank you for allowing me to testify again on the important issues of future fuel economy potential. The analysis in my testimony is based on work initiated for the OTA and since updated for various other clients. I would like to take this opportunity to provide the Energy Committee members a more in-depth look at the technologies behind the projections described by Mr. Plotkin, as well as the attributes of cars available in 2001 if a "maximum technology" level of fuel economy standard is imposed.

The method I have chosen is by picking a popular current mid-size car model and tracking the changes required. I have used the Ford Taurus in this example, as it is a modern fuel efficient car that is safe, relatively fuel efficient and can seat six passengers. The analysis could have selected other comparable cars such as the Buick Century or Eagle Premier with only slightly different results. The Ford Taurus is more efficient than the average domestic car as it already incorporates an aerodynamic design, a low friction V-6 engine with multipoint fuel injection, and a four speed automatic transmission. Hence, the percentage increase (from the 1990 base) in fuel economy will be somewhat lower than the average achievable for the fleet.

The particular model used in the example is the Taurus sedan with a 3 liter V-6 rated at 140 HP and 220 Newton-metres of torque. It can accelerate from 0 to 60 mph in 9.8 seconds and has a CAFE rating of 27.4 mpg. Our analysis of future fuel economy potential traces possible technology improvements assuming that (1) the new technologies are optimized for fuel economy and 2) the 2001 vehicle has the same interior room and acceleration performance as the current vehicle. The most significant source of fuel economy improvement is through the employment of advanced engine technology. The current 3 liter V-6 is a 2-valve pushrod type design. It can be replaced by an overhead cam 2.0 liter 4-cylinder engine that has 4-valves per cylinder, a compression ratio of 10:1, and intake valve control. This engine would actually have a higher horsepower rating of 145 HP but a lower torque rating of 190 Newton-metres. Torque is better measure than horsepower of low speed performance (e.g. around town) and to compensate for the decreased torque, a higher axle ratio must be used.

The car size (both interior and exterior) is held constant, but the weight is projected to decrease from the current 3090 to 2810 lb. Part of this will be due to the engine size reduction. If the new engine is made from aluminum, the engine weight alone would be reduced by 100 lbs. Another 240 lbs would be reduced from the use of advanced plastics for the front fascia, the fenders, hood, etc., the use of aluminum, magnesium and high strength steel alloys in load bearing structural components, and a redesign of the structure to capture secondary benefits. The 1990 Taurus already has an air bag but the future side impact requirements and new emission standards will add about 60 lbs to the weight of the car. The car is assumed to meet the Tier I emission standards mandated in the Clean Air Act, but not the Tier II standards that may be imposed in the post-2000 timeframe.

The hypothetical 2001 Taurus would be more aerodynamic, with a drag coefficient of 0.30 which is equal to the best of today's cars. It would use a five speed automatic transmission that is electronically controlled to optimize gear shifts and torque converter lock-up. The car would also feature improved tires with lower rolling resistance and low friction oils in the crankcase and drivetrain. Table 1 summarizes the major differences between the 1990 and hypothetical 2001 Taurus.

These technologies will allow the fuel economy to be 35.3 in 2001 MPG according to EEA's estimates, or a 29 percent improvement over the 1990 car. The vehicle is forecast to have nearly equal acceleration performance at low speed and slightly better performance at high speed. Physically, the car will have the same exterior and interior size, but will be more sleek in appearance due to the reduced drag coefficient. EEA believes that ride quality will be equal to or better than today's Taurus. Moreover, the 2001 car will save 470 gallons of fuel over 50,000 miles, assuring that the on-road MPG is 15 percent lower than the EPA test MPG. Any forecast involves some degree of uncertainty, and we believe the fuel economy forecast is accurate to ± 0.5 MPG. It is possible that the technologies changes could adversely affect driveability and maintainability, although I have no reason to suspect this will happen.

At the same time, I am not suggesting that these changes can be made easily by 2001. The 2001 car as described will require a completely new design for the body, engine and transmission, all of which involve substantial capital investment. On a discounted cash flow basis, gasoline must cost over $2.00 per gallon for the consumer to recoup the increased first cost of the car over 50,000 miles. Hence, the maximum technology scenario will not be cost-effective to the consumer if gasoline is selling at a much lower price than $2.00 per gallon. It is important to be aware of these factors when considering MPG targets defined by a maximum technology scenario. I should note that the technologies described are not the only way to attain 35.3 MPG. If, for example, the two-stroke engine is commercialized by 2001, the car may attain an even higher level of fuel economy in 2001 at lower cost.

Some have suggested that the threat of increased fatalities exists if fuel economy is improved. The total forecast weight reduction is not large and weight is only one many factors affecting safety; it is obvious that increasing the weight of car by loading a sack of bricks on the rear seat will not make a car safer. Safety also depends on the materials used, the design of the impact energy absorbing structure and the total length of the car. NHTSA recently released the results of crash tests of several 1990 models, and the model with the poorest rating was also the heaviest, proving the importance of factors other than weight. The point here is today's 2810 lb car is quite different from the hypothetical 2810 lb Taurus that could be available in 2001, as the future car will be as long as today's 3090 lb Taurus, but will feature greater use of advanced high strength materials. Transferring weight based fatality rates derived from today's cars to a 2001 vehicle is analytically incorrect since the materials used in today's cars are not be the same as those hypothesized for the 2001 car.

Lastly, we have considered the impact on the manufacturer. The industry operates on a 8 year product cycle, and the Taurus was first introduced in 1986. Industry analysts expect Ford to introduce a new model Taurus in 1994/5, and the product cycle suggests that the next model will be introduced in 2002/3. It is too late to influence the new model planned for 1994/5, so that Ford could normally introduce the type of car forecast under a maximum technology scenario only in the 2002 or 2003. By forcing the introduction on or before 2001, Ford will lose 2 to 3 years of product life, which will result in significant lost revenues for Ford. Since the capital investment is amortized over an expected sales volume, the reduced product life will negatively impact Ford profits. The current 5 year lead time and 8 year product cycle suggests that 2005 is a better target year if technology forcing legislation requiring the complete redesign of all products is considered.

In summary, I would like to stress four points. First, the EEA analysis is detailed and fuel economy projections are based on extensive technology analysis. Second, the projections hold the vehicle interior volume and acceleration performance levels constant at current levels but consumers may find the cars less desirable in terms of first cost and, possibly, driveability or maintainability. Third, the fuel economy projections based on a maximum technology scenario require the complete redesign of the vehicle body engine and transmission, and the technology utilized will not be cost effective to the consumer unless gasoline prices are over $2.00 per gallon. Fourth, we believe that the safety concerns about increased fatality rates due to CAFE may exist, but weight based fatality rates derived from current vehicles cannot be blindly applied to project fatality rates in 2001.

I will be pleased to answer any questions you may have.

TABLE 1
COMPARISON OF VEHICLE TECHNOLOGIES
IN 1990 AND 2001

	1990 Ford Taurus	Hypothetical* 2001 'Taurus'
Weight	3090 lbs.	2810 lbs.
Interior Volume (passenger + cargo)	100 + 17 cu. ft.	100 + 17 cu. ft.
Drag Co-efficient	0.33	0.30
Engine Size	3.0 Litre V-6	2.0 Litre I-4
Valve Train	2-valve/pushrod	4 valve/DOHC with variable valve timing
Compression Ratio	9.3	10.0
Power	140 HP	145 HP
Torque	220 N-m	190 N-m
Transmission (automatic)	4-speed with lock-up	5-speed with electronic control and lock-up
0-60 mph time	9.8 sec.	10.0 sec.
Fuel Economy (EPA composite)	27.4 MPG	35.3 MPG

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* Under a "maximum technology" scenario.

The CHAIRMAN. Thank you very much, Mr. Duleep.

Now you talked about this, was it a Buick you had as your 35.3 miles per gallon by the year 2001 with max tech?

Mr. DULEEP. Yes, sir, any mid-sized car. I just used the Taurus as an example.

The CHAIRMAN. Oh, the Ford Taurus, okay.

Now you say that by the year 2001, you could get it, using max tech, you could get a 29 percent increase, which would give you 35.3 miles per gallon.

Mr. DULEEP. Yes, sir.

The CHAIRMAN. But even with doing max tech, that would not reach the Bryan bill target.

Mr. DULEEP. That is correct, sir, and this would be just plain fuel economy, and as Mr. Plotkin mentioned, there are other credits available.

So CAFE compliance may be somewhat different than just fuel economy. The two need not be—necessarily go hand in hand.

The CHAIRMAN. I understand. But if you were trying to reach the Bryan bill targets with fuel economy, you would not reach it with max tech by the year 2001?

Mr. DULEEP. No, sir.

The CHAIRMAN. But in order to reach that max tech you would first of all have to do away with 2 to 3 years of product life for Ford, and you said that would come out of Ford's profits. And what did Ford lose just this year?

Mr. DULEEP. A lot of money.

The CHAIRMAN. A lot of money. Now what kind of increase in cost would it cost Ford to make this max tech car?

Mr. DULEEP. Sir, there are two types of costs. First, is of course, the lost product life of the model that they will introduce in 1994 and 1995, and that comes straight out of their bottom line in that case.

And the second kind of cost would be the increased cost of making a technologically more advanced new model, and that particular cost, under normal circumstances, it will increase the price of the Ford Taurus by over $800 in today's dollars.

The CHAIRMAN. Over $800?

Mr. DULEEP. Over $800 in today's dollars, but that assumes that it is part of the normal cycle, not some accelerated cycle where they scrap existing——

The CHAIRMAN. And you say, in order to be cost efficient for the consumer, you would have to have gasoline at over $2 a gallon in today's dollars?

Mr. DULEEP. In today's dollars, yes, sir.

The CHAIRMAN. Would that not suggest that the consumer would not be willing to pay this additional $800 for this automobile?

Mr. DULEEP. Certainly, it would make it less desirable. Obviously, many consumers—there would some kind of elasticity, that we would have to determine consumer response to the increased price, but many consumers on the edge obviously would not find this desirable.

The CHAIRMAN. Now we know a lot about consumer response to miles per gallon and fuel efficiency and performance and size and all of those things. Do we not have a pretty good record of that now?

Mr. Plotkin, do you want to try that one?

Mr. PLOTKIN. I guess my response to that would be, we know a lot about it, but we do not know so much about it that we can easily predict what will happen if we change any of these factors.

And the evidence I have is the way some car models fall flat on their faces, even though all this market research is done. I think there is a very high level of unpredictability in the market, and if it were less so, then we would not see the market reacting the way it does——

The CHAIRMAN. But predicting the market is at best an art and certainly not a science.

Mr. PLOTKIN. Exactly. Can I point out one other thing?

The CHAIRMAN. Yes.

Mr. PLOTKIN. Senator, if I could look at emission standards as sort of an analog of what we are proposing to do here with fuel economy standards, when you increase the price of an automobile for reducing emissions, consumers get nothing personally, even though society benefits, but the price of the automobile is higher and yet they are still bought because everybody has to do it.

And it is fair, I believe, to look at a fuel economy standard which goes beyond what the consumer would want from a personal level, to say maybe, even though gasoline does not cost $2 per gallon, its actual price to society may be $2 per gallon.

And I think that is the basis upon which many members of Congress want to push these standards as high as they do.

The CHAIRMAN. But not by a tax on gasoline.

Mr. PLOTKIN. But not by a tax on gasoline, that is correct. They want to do it the regulatory way——

The CHAIRMAN. Mark me down as against the tax on gasoline.

In my written questions to you, I asked what kind of reductions in size or performance might be necessary if the auto industry could not meet the Bryan bill targets through some combination of technology changes and alternative fuel credits.

Can you give us a preliminary answer?

Mr. DULEEP. Yes, sir. We have considered what might be required, and again, we are making the three assumptions. First, as you said, no alternative fuel credits, and second, no gaming, which is somehow changing the name of the company so you become an all new company or something like that.

And third, we look at the whole issue that in fact, most of the technologies that we say can be done will in fact occur.

Under those assumptions I think if I were sitting as president of an auto company and looking at their profit margins and so, the first thing to go would be the sports cars, which would be the Mustangs and Camaros and so on, because they are relatively low volume, sales volume. They have low fuel economy and their prices are not very high so you do not make as money per car.

So you would drop those first, but that still would not get you to the 38 or so, simply because there are not that many of them sold. You would have to impact some fairly high volume segments, so you would have to drop maybe the full-sized passenger cars, which might be like the Crown Victoria, the Cadillac, full-size model.

Those kinds of cars may have to be dropped or at least, very definitely restricted or completely dropped to try and get to 38.

And then another strategy might be to try and reduce the performance of all cars across the board, much like what happened back in 1980, 1981, right after the oil crisis in 1979 and 1980.

The CHAIRMAN. Well, the consumer preferences are going toward higher performances, not lower performance, are they not?

Mr. DULEEP. That is true, sir. As people become more affluent, they seem to want a lot more from their car.

The CHAIRMAN. All right. Now let us say that we adopted the Bryan bill targets and they did do away with the bigger cars, the big Fords, the big Cadillacs, all the sports cars, would the American consumer have no ability to buy a big car or would they simply not have the ability to buy an American, new big car?

Mr. DULEEP. Sir, that would depend on that gaming assumption. So maybe some new manufacturer from Korea might come up and offer a big car because we do not know exactly what standard would apply to that manufacturer, the way the bill is now.

But assuming something like that happens, the standards would actually, the Bryan bill type of standards would actually force the Japanese manufacturers of the luxury car markets and it would make life quite difficult even for the Europeans.

So given all of that, we would think that the full-sized car as we know it today might be extinct.

The CHAIRMAN. Might be extinct?

Mr. DULEEP. Extinct.

The CHAIRMAN. You mean the new full-sized car?

Mr. DULEEP. The full-sized car in terms of like a Crown Victoria or the Cadillac or——

The CHAIRMAN. The guy who has a Crown Victoria now, likes a big car, might just send it into the shop and get an overhaul and some new points and plugs or whatever. Is that not right?

Mr. DULEEP. That is quite possible, sir.

The CHAIRMAN. And if that happened, would be the real effect on miles per gallon?

Mr. DULEEP. Sir, it would certainly be much lower on a fleet-wide basis, it would certainly be lower. But one of the problems is that when a car becomes really old, people do not like to drive them as much because they are scared it might break down somewhere on the road and so on.

So the miles per year tend to go down a little bit, which offsets this holding on to the car for very long problem. So it is a difficult problem to consider in the hypothetical scenario.

The CHAIRMAN. Now tell us about this new entrant problem? You said you might have a new Korean manufacturer or some new subsidiary?

Mr. DULEEP. Sir, the way the law is written now, it specifies a percent increase, in the Bryan's bill case, over 1988 and in the Senate bill's case that we are considering today, over 1990.

And the problem is that if you are not around in 1988 or 1990, then what is the percent—it is a percent over what. It is not defined. In other words, what is the base MPG by which you multiple this percent, it is just not defined.

And one can postulate any kind of scenario. One idea is that maybe 27.5 ought to be defined for these people, which would give one set of answers. And another one is that he makes some kind, that a manufacturer makes an application saying this should be my equivalent standard or something like.

And since it is not defined, it just leaves open a range of possibilities. If a new entrant comes in, he may have a lower standard than a manufacturer producing the identical range of cars, but was already in the market in 1988 and that leads to the possibility for gaming the standards.

The CHAIRMAN. Now, Mr. Plotkin, I think it was you or someone said that ours would contemplate a roll-back to 1990 size and performance. My question was about the word, roll-back.

Mr. PLOTKIN. Well, analytically it means a roll-back. I mean, the bill asks that the maximum fuel economy be calculated, examining the 1990 fleet as sort of a baseline.

It does not mean necessarily, of course, that the fleet itself in the real world gets rolled back. There are other ways to improve fuel economy——

The CHAIRMAN. But my point is that the trend is up from 1990.

Mr. PLOTKIN. That is right.

The CHAIRMAN. So our assumption of 1990 does mean in fact a roll-back of size and performance——

Mr. PLOTKIN. Yes, it does——

The CHAIRMAN. From that which the consumer would otherwise have available and probably buy.

Mr. PLOTKIN. We calculate that the difference between the 1990 levels of size and performance and what we expect them to be in 1995 will be about 1 mile per gallon. That is, the fleet will get 1 mile per gallon less fuel economy at the actual 1995 levels than it would have gotten had it achieved the 1990 levels of size and performance.

The CHAIRMAN. One further question. We often overlook the light truck fleet in discussing CAFE. In my written questions I asked you for your most recent analysis of fuel economy potential for light trucks.

The staff has prepared a chart showing the results you gave them. Can you briefly describe your results and tell us how these results compare to the Bryan bill?

Senator MURKOWSKI. Mr. Chairman, would you yield?

Does that include pickups in that light trucks, light farm vehicles?

The CHAIRMAN. That is right.

Mr. DULEEP. Maybe I ought to clarify that, just for a second. The CAFE, the way the CAFE regulation is written, it is pickups up to 8,500 pounds. Which means some of the three-quarter ton pickups, the manufacturers have a model at 8,600 pounds, so it just a little bit over the CAFE and they are not covered by CAFE standards.

So it is about 60 percent of the full-size pickup fleet would fall under 8,500 pounds. So those are the only ones that are covered by CAFE in these numbers.

Senator BURNS. Would that include a three-quarter ton? Do they go over that weight?

Mr. **Duleep**. Many of the three-quarter tons are sold at just slightly over the limit. So this would not include those trucks, but just everything up to 8,500 gross vehicle weight.

So again, as you can see the projections here are quite a bit below what the Bryan bill targets might be for the domestic manufacturers. We have not taken as detailed a look at the imports, but I suspect it is worse.

The **Chairman**. Let me interrupt briefly to tell Senator Wirth, we have been using these terms, product plan, and that is where we are going now. Max technology assumes a 100 percent market penetration for all technologies that are known that can be applied. And obviously, you understand the Bryan bill target.

Senator **Wirth**. Thank you, Mr. Chairman. I am sorry I was not here. Mr. Duleep is the person everybody terms the guru.

Mr. **Duleep**. Sir, in this case, it is obvious I believe that the Bryan bill target should be relatively difficult to meet for pickup trucks or the entire light truck fleet. We project, for example, they can, even with maximum technology, they would barely make 30 percent improvement, if that, and that is not saying that even that is easy.

It is like if they did everything, it would be difficult to get to 30 percent, let alone 40, just through technology. But of course, again, I would emphasize that CAFE numbers and fuel economy need not be parallel simply because of all the credits and the loopholes and so on available.

The **Chairman**. Thank you very much for that. Let me just close by saying that, giving you my own philosophy and to tell you what we are trying to do here, or least what I am trying to do, and I think that is a shared by a number of the members of the committee.

And that is, to try to stretch Detroit to the absolute maximum, consistent with consumer acceptance. That is, we want to get the best miles per gallon we can get without costing American jobs, without costing American market share, without hurting our economy.

And I think that ought to be our endeavor and we will continue to be working with you to try to find that mix of technology and size and performance, et cetera, that will get us there, because I think what is coming through to me very loud and clear is that if you try to force it beyond that point, and first of all, you may not get there because they either do not buy the cars or there is gaming or you lose a lot of American jobs and a lot of American market share, and that does not serve anybody.

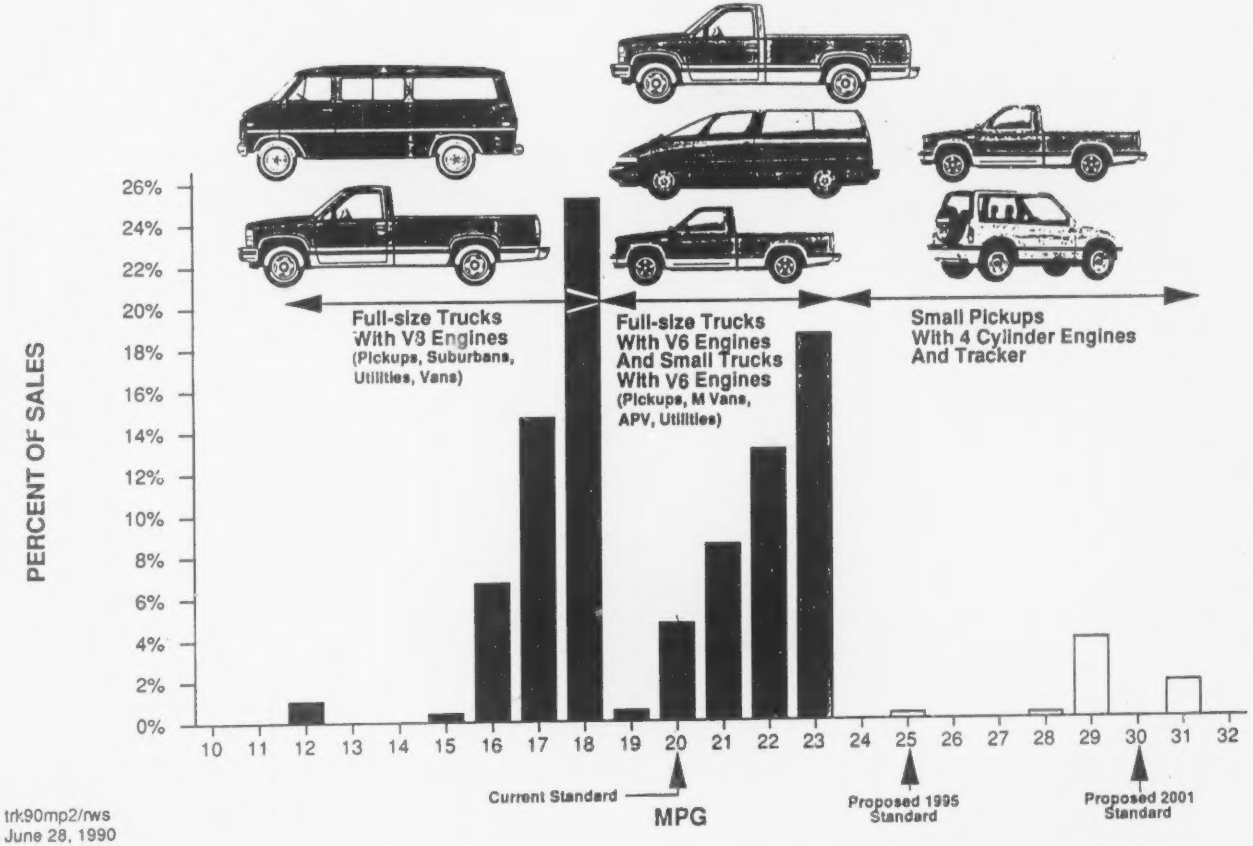
Senator Wallop.

Senator **Wallop**. Thank you, Mr. Chairman.

Let me just go on with that idea. I have here a chart that is based really upon the answers that we received from you. These are current, where they sort of cross lines and this is what happens, the proposed 1995 standards. It basically puts all the models out.

[The information referred to follows:]

GM 1990 LIGHT TRUCK FUEL ECONOMY



trk90mp2/rws
June 28, 1990

Senator **Wallop**. What I would be seeking for, and perhaps you could assist us in achieving, is something besides the narrow concept of just a fuel standard. I mean, what it carries has got to come in there.

I look in here and see that there will be, for example, no more Suburbans. My son runs a fishing guide service. It would simply mean that he would have to have two Samurais instead of one Suburban. I am not certain that that adds—it certainly does not add to the efficiency. It means another guide, another driver.

But I do not think it adds anything to fuel consumption, and in fact, you would probably lose ground by operating two vehicles where one would have. So is there some kind of capacity efficiency linkage that could be devised that makes any sense?

I mean, it seems to me, to lose capacity is not necessarily to achieve efficiency.

Mr. **Plotkin**. I guess the one answer I have to that, Senator, is that it depends—there are clearly ways to improve the efficiency of the trucks without reducing their capacity.

The question we have to answer is how much? If we go beyond that point we start to have to get rid of some of the higher capacity trucks. So our job then is to define the point that you can achieve without compromising the utility of these trucks.

What Mr. Duleep is doing here is trying to define that point, and at the 26 miles per gallon, I believe the idea there is that you can maintain that kind of a vehicle. If you go beyond that point, you cannot.

Senator **Wallop**. But it would be true that if you lost capacity and capacity was a requirement in the utility of a given vehicle, that you probably would lose ground on national fuel efficiency rather gain it, by having to operate two. To say nothing of the lack of economy in having to hire an extra person to do what one had been able to do before.

But just leaving that aside you still probably do not gain anything by requiring two vehicles to do what one did.

Mr. **Duleep**. Senator, in answering that question, I think the light truck market especially is one that is a very complicated market. There are a lot of people who never load anything on their pickup trucks and just like it because of the way it looks.

And that is a—and there are a lot of people who use it because it is very useful implement for them, and you have the urban cowboys and the people who really use them, and it is hard to separate the two.

Senator **Wallop**. I understand that. But people in Washington seem to forget that America does work too, and to penalize those who work because there is a market for the tools that the working part of America uses, does not seem to me to make any sense at all.

If we are going to try to remain a competitive nation, to penalize people who like working tools, but do not work with them, is to sort of shoot yourself squarely.

I just want to examine a couple ways, and by the way, I appreciate both of your testimony here this morning. It is very helpful to have these kinds of lucid explanations.

I am still on what I view as being a different philosophical side than both of these are seeking to achieve. But this whole business of manufacturers being able to achieve credits for alternative fuel capacity strikes me as only a way of adding expense to the consumers, by and large.

There will be, again, segments of it where it is entirely feasible for people to go to compressed gas. Other people will just buy it and never have an opportunity to use, have that other vehicles capability. But the more important part of it is to give credit for that is in effect gaming the system, is it not?

Mr. PLOTKIN. Yes.

Senator WALLOP. I say that because some alternative fuels, there is some actual loss of efficiency in BTU, miles driven, compared to gasoline. If we are going to provide credits for those kinds of fuels, it is essentially hypocritical is it not?

Mr. PLOTKIN. Senator, can I respond to that? For the most part, there are three reasons to go to alternative fuels. One is to get rid of oil, to back oil out of the system. One is to address the question of global warming, and the third one is to address the question of urban air quality problems.

I think it is pretty clear that the alternative fuels that have been proposed will back out oil, and they will help air quality problems. The global warming issue, which is really sort of a BTU issue, if you use more BTU's in the whole fuel cycle, you are likely to produce more carbon dioxide.

That one is trickier, and there are some alternative fuels that have a problem in that regard, but I think it is clear that for the other two goals, the air quality goal and the backing out oil out of the system goal, alternative fuels will help.

Senator WALLOP. But if you have to import the alternative fuel, or at least a portion of it, you begin again to lose ground on what this business is all about.

Mr. PLOTKIN. It is certainly better to use a domestic fuel than an imported one, all things being equal. But for example, there are more sources of natural gas; they are more diversified than there are oil, so there is some benefit.

Senator WALLOP. I understand that. And the problem is that everybody is thinking solely of natural gas unless your name happens to be Archer Daniel Midlands. That is not exactly in the back of their mind.

I would like for you to examine with me a little bit, too, the area of environmental standards.

I think I understood you to say, Mr. Duleep, that tier 1 can probably be accommodated within the CAFE procedures, but probably not here too? Would you explain that again?

Mr. DULEEP. Sure. The forecast here includes some penalty for the tier 1 standard, but we are taking any additional penalty for tier 2 simply because we do not know when it will be imposed and exactly what the technology will be. Many think, for example, that tier 2 standards will force the introduction of alternative fuel vehicles, so it almost guarantees a large CAFE credit, in other words.

So, the effect of a tier 2 standard on CAFE might be somewhat strange. That is, actual fuel economy may go down. Because of the use of alternative fuel vehicles, you might get a big CAFE credit, and it might pull your CAFE up.

Senator WALLOP. I worry that we sort of overlook the whole concept of American efficiency in all of this. We are to be a competitive Nation and a world trading economy.

I think we have to careful as to how much of a burden in cost and inefficiency we lay on in pursuit of another level, and that balance, I think, comes closer under Senator Johnston's and my proposals clearly than does the Bryan bill which is really beyond the capacity of the American consumer, to say nothing of the American producer, to achieve.

Mr. Chairman, thanks. I will have a couple of questions, but we have a lot of witnesses and a lot of Senators.

Senator JOHNSTON. Thank you, Senator Wallop.

Senator Conrad.

Senator CONRAD. Thank you, Mr. Chairman. I first want to say as someone who is a co-sponsor of the Bryan bill, that there is no question in my mind, after the hearings that we have had, that there are problems with that bill.

I think many of us knew there were problems with that bill previously, but certainly we have outlined some of the defects here, and I want to commend you and the ranking member for holding these hearings and having these witnesses to point out the problems that exist.

I still think there are some very positive things with respect to that bill along the lines of what, Mr. Chairman, you outlined as the goal that you have.

Let me just say that I share the goal that you have. I think we want to press the automobile industry as far as we can without adversely affecting the safety, without adversely affecting the economics of the automobile industry in this country.

I think that is very important, and where that position lies is a difficult one to ascertain. I think the testimony we have had here this morning is excellent, and I want to thank Mr. Plotkin and Mr. Duleep for once again providing, I think, very good information in which direction we have to go.

One of the things that strikes me as being quite clear, much more clear than it has been previously, is the notion that the time periods that we have previously talked about perhaps really do not fit the facts.

Mr. Duleep and Mr. Plotkin, if I could pursue that for a moment, would both of you agree with that analysis, that the 1996 and 2001 as target dates are not necessarily the most relevant, and if so, what target dates would you advocate that we look at? Mr. Duleep?

Mr. DULEEP. Sir, I would agree with you, especially for the 1996, simply because model year 1992 starts in September, and that is 4 more years. And it is a very short period for the long lead time in the car industry.

Senator CONRAD. What should we be talking about, do you think?

Mr. DULEEP. I think in my testimony I noted the 8 year product cycle and the 5-year lead time. So, all the products would take about 13 years to roll over if you give them a signal now, considering that model year 1992 starts in September.

If I add 13 to 1992, I come up with 2005. That may be a good year. It is also a year, I understand, for a lot of international agreements on greenhouse gas focus on. The Bruntland Commission has some 2005 agreements that many nations have signed onto.

Senator Conrad. How about a near term? Would you just have the one date or would you have a near term date as well for some changes?

Mr. Duleep. I think that large depends on whether you feel that technologies will start to come on stream on their own, or whether the automakers need pressure. I will let Mr. Plotkin answer that one.

Senator Conrad. Mr. Plotkin, if I might ask you the same question? What do you think? I take it from your testimony that you would be looking at 2003, 1998, 2003; did I hear you correctly?

Mr. Plotkin. I suggested that is worthy of examination. I must admit to you that as I was writing this testimony, it just suddenly occurred to me that I have been just focusing on the dates I have been given, and my job is supposed to go beyond that. But I had not been doing that in this regard.

Senator Conrad. So you have not been doing your job?

Mr. Plotkin. That is right.

[Laughter.]

Mr. Plotkin. I just felt it was time to step back a little bit and look at the problem from a slightly different angle and ask, is this really the best date? Again, I am not comfortable with the 1995, 1996 time frame because there is so little that can be done.

I mean, maybe you can squeeze another mile per gallon about the product plan, but it is so little that I wonder whether the agony of going through this process here is really worth it.

On the other hand, if you give a few more years so that you can really have redesign within that period, you can maybe achieve a lot more. So, I think 1998 is a year I would like to examine a little more carefully.

But I have not had the time to really think about it in depth. That is just a date that I threw out as one possible date.

Senator Conrad. All right. Let me ask you this question. The chairman was focusing on the Taurus, and you were talking about going to 35.3 on the Taurus by 2001, which wouldn't meet the overall standard, but, of course, the overall standard in the Bryan Bill is not dependent on Ford Taurus or just mid-size cars. It is the full fleet.

You were talking there about a 30 percent increase by 2001 with respect to that 1 mile; is that correct?

Mr. Duleep. 29 was the number I came up with.

Senator Conrad. A 29 percent increase. In your judgment, and I would ask you both, what kind of percentage increase is the kind of percentage that we ought to be looking at with respect to, for example, a 2003 date that would be realistic, that would meet the standards that have been set out in terms of safety and performance and not having the kind of adverse economic consequences none of us want to see?

Mr. Duleep. That is a tall order.

Senator Conrad. That is the spot we are in, gang. So join the crowd.

Mr. PLOTKIN. Let me say in a sense, here, you are standing my job on its head. My job is to try to give you as much information about the impacts of different levels of standard, and then let you apply your value system to it.

I cannot really begin to tell you what the appropriate standard is.

Senator CONRAD. Let me give you this standard. The standard I am trying to get you to apply is the one the chairman enunciated. The chairman enunciated a standard that says same performance, same safety, roughly same size, in pushing the industry to the limit without getting an adverse consumer reaction.

Now, I know that is a lot of judgment calls in there. I understand that. But we have got to make judgment calls, and nobody has followed this more closely than the two of you have.

I am interested in just what would be your sense of what kind of percentage increase we could reasonably expect to get by say, 2003?

Mr. PLOTKIN. I am not entirely uncomfortable with the max tech kind of percentages. I am aware that consumers have been willing to pay more money for their cars than perhaps they get personally back because of emission standards, for example. That is, they understand that the environment benefits are important, even though they personally only get a little piece of that benefit.

Senator CONRAD. Let me just say to you, with respect to that. For somebody who likes to run, living in Washington, D.C., and you have got 30 days in a row when the radio comes on and advises you do not run outdoors, there is a value that you attach to doing something about it.

Mr. PLOTKIN. That is right, except people usually like other people to spend the money for emission controls rather than themselves. They like to see it out there as long as it does not affect their bills.

To a certain extent, I think a lot of the consumer reaction is going to depend upon whether consumers perceive that this really is to society's benefit. If they think this is a boondoggle, I think they are going to be very adverse to spending more money for an automobile because of that.

But if we can somehow convince them that this is necessary for a variety of reasons—oil import savings, global warming problems, et cetera, then I guess I believe that if we can make that case, that consumers will go along. And also, we have got to make sure that the cars are still reasonably attractive to them, clearly.

I think the max tech kind of scenario is expensive, although it is less expensive if you give them a little more time.

And there are also some possibilities, especially in the 2003 time frame, that we can do this cheaper. Our estimates are based on what we know now, based on using only current technology. There are a lot of other technologies like two-stroke engines, for example, that could come into play in that time frame, and those engines, hopefully, will be cheaper to manufacture and will allow you to achieve some substantial fuel economy gains without necessarily raising the price of the cars.

At least, it is sort of a preliminary answer. I am not uncomfortable with the max tech levels.

Senator CONRAD. Which would be 30 percent roughly?

Mr. **Plotkin**. In that range.

Senator **Conrad**. Thank you. Thank you, Mr. Chairman.

The **Chairman**. Thank you. Next is Senator Burns.

Senator **Burns**. Thank you very much, Mr. Chairman. I have a statement I would like entered into the record.

The **Chairman**. Without objection.

Senator **Burns**. Mr. Chairman, also with my statement there is an article that comes out of the Forbes Informer that I think deals with the new Ford Crown Vic that I would like to also enter into the record at this time.

[The prepared statement of Senator Burns and the information referred to follow:]

CAFE STANDARDS S. 279
COMMENTS BY SENATOR CONRAD BURNS (R-MT)
ENERGY AND NATURAL RESOURCES COMMITTEE
MARCH 20, 1991

Mr. Chairman, I am in strong opposition to CAFE standards. This bill is a classic example of over-regulation and "the government knows what's best for you," syndrome.

Yesterday, the Commerce Committee voted 14-5 to proceed with S. 279, the Bryan Bill. I think the decision to proceed with the CAFE bill at this time is ill-timed and ill advised. I believe CAFE needs to be included in the WHOLE energy package, not separately. The Commerce Committee should proceed slowly and be careful not to focus on just one aspect (CAFE) of the energy strategy but work with the Energy Committee to develop a comprehensive package.

Mr. Chairman, it would appear CAFE is on a fast track on yet the Congress is charging along and not waiting for the DOT to publish its study on CAFE policy which is being done by the National Academy of Sciences' that is due out in June. The NAS study will address not only what can be accomplished technologically, but also the rate at which those technologies can be introduced, the safety implications, the economic effects on the industry, the marketability of new vehicles, and the effects of future regulatory requirements. However, the Congress is throwing caution to the wind and diving in feet first without having all the facts.

I believe we need improvement, however bills which mandate unrealistic goals and do not deal with the fundamental problems just won't work.

The fleet is three times more efficient today than when CAFE was first written. Every new vehicle of every size is several times more efficient than its 1974 counterpart. Yet, the American public is consuming more energy, because people are driving longer distances, something the people of Montana know well. Today we import 47 percent of our oil even though our automobiles are more efficient. Before CAFE standards we imported only 35 percent of our oil.

CAFE will do nothing to get older, less efficient cars off the road. In fact, if these cars are not replaced energy conservation and anti-pollution efforts will be rendered moot. Manufacturers may be forced to adopt expensive technologies, making new cars more expensive, encouraging drivers to keep the old gas-guzzlers.

What CAFE could do is place the future of light trucks in jeopardy. More than half of all automobiles sold in the Montana are light trucks, and in the whole cosmopolitan spectrum of cars, trucks is a small portion. But in Montana it is the bread and butter choice of transportation.

Nationwide, there is a rapid rise in the number of pickup trucks and vans over the past several years. In many respects, these vehicles have gained popularity due to the fact that they have cargo carrying capacity and utility features -- such as the ability to carry equipment, tow boats, livestock trailers, or other objects no longer available in passenger cars. In large part, the lack of hauling and towing capacity in passenger cars comes as a result of the existing fuel economy program. Thus, consumers who need these features in a vehicle must purchase light duty trucks or vans instead of passenger cars.

Let's all understand what we are doing to the consuming public with this bill. We are legislating the full-sized pickup out of the market. Mr. Chairman, the reason for this is that in order to achieve 20 percent and 40 percent increases in fuel economy over existing levels, manufacturers would be forced to drastically down-size their vehicles. What will the result be? Well, aside from the safety problem, if you are a rancher or farmer, you are not going to have the ability to carry the equipment or supplies that you need in order to keep your operation working efficiently. If you are an outdoorsman, it means that your ability to purchase 4 by 4's or vehicles that can tow boats, or livestock trailers will be severely limited.

Imagine for a moment trying to pull a fully loaded livestock trailer with a 1.5 liter four cylinder engine over the Continental Divide outside Helena. My guess is that it would be impossible to get that rig over the Divide if this bill were to be enacted.

If you are a tradesmen, a plumber, carpenter, contractor or a brick mason, you are going to have great difficulty carrying your tools and your cargo in order to do your job. Ask these people what the effect will be. Ask the ranchers and farmers of my own state of Montana. They will tell you what their needs are. They will tell you why they need the vehicles they have today and they will tell you what will happen if they cannot have the vehicles they need to do the jobs they have to do.

A couple of weeks ago in this committee, I asked Mr. K.G. Duleep from Energy and Environmental Analysis, Inc. if under the Bryan bill, whether or not there would be any pickups, half-ton, three-quarter, or ton doolies on the market at all, at ANY price. Mr. Duleep's response was and I quote, "I believe the analysis that we did does show it is very difficult for such trucks to be sold. They would certainly have to restrict the product and they may go out of business on that."

Mr. Chairman, I was further puzzled yesterday when I read an article in Forbes magazine. I ask unanimous consent to have the article included with my statement. The article contains an explanation from Tom Wagner, a Ford vice president on Ford's new luxury Crown Victoria. Wagner said that having the seats foreign-made enabled Ford to show that 27 percent of the Crown Vic is foreign made thus allowing Ford to claim the car as an import. The Crown Victoria is classified as a import to prevent the car's fuel average from bumping up the mileage average of the rest of Ford's line above the set limit. Wagner goes on to say and I quote, "If we had to include Crown Vic and Grand Marquis in our domestic numbers we wouldn't build them. It's that simple."

I hope someone is willing to explain to the Congressional leadership why they have to be driven around in a Geo Metro instead of their sedans in the coming years.

In the last quarter of 1990 the auto industry lost $2 billion dollars without any help from the Congress. This year the automobile manufacturers will have to implement systems to clean up the air in compliance with the Clean Air Act. The Congress has also passed mandates on improving safety. All these mandates come with a cost. The vehicles will be heavier, reduce engine efficiency or both.

The thought of increasing the CAFE standards makes no sense to me. The Congress is once again going to pass a bill that will place the burden on the little guy. The small businesses, farmers and even families of four will suffer under this bill. I will vote against this bill today and hope my colleagues will read my statement and talk with their constituents back home and listen to what working America has to say about their vehicles.

Thank you, Mr. Chairman.

FORBES INFORMER

EDITED BY ERIC SCHMUCKLER

Good seats

FORD'S NEW LUXURY Crown Victoria is two tons of old Americana. It's big, has an engine in the front, is rear-wheel-driven and gets 25mpg on the highway. But for government purposes Ford got the Crown Victoria classified as an import—not by having it assembled in Canada (that counts as U.S.-made by treaty) but by "changing where our seats came from," beams Tom Wagner, a Ford vice president. Foreign-made seats and juggling some paperwork enabled Ford to show the Crown Vic is 27% foreign made, and officially an import.

Ford's New Crown Vic

Is this a foreign car?

Why bother? Because placing the Crown Vic into the import category prevents the car's fuel average from bumping up the mileage average of the rest of Ford's line above a set limit, risking huge fines. "If we had to include Crown Vic and Grand Marquis [a full-size car from Mercury] in our domestic numbers," says Wagner, "we wouldn't build them. It's that simple." —JERRY FLINT

Forbes ■ March 18, 1991

Senator **Burns**. I guess I missed something here because yesterday they voted the Bryan bill out. I voted against it yesterday because, number one, I do not think it is attainable. I think it is a dream. And with the present technologies, I am concerned about the same thing that Senator Wallop is worried about. America likes to work. And we have not dealt with this thing. It takes so much energy to move so many pounds from point A to point B.

Now if they want to take out the three-quarter ton and half-ton pickups and you have to buy two little old Toyotas, and I do not mean anything against the Toyotas, but they are just little bitty things, and you have to replace that half-ton pickup with two Toyotas, you got the added expense of not only another driver, but you are using twice as much fuel. Your emissions are twice as much. And we have not accomplished a thing. We have also contributed to the congestion of coming out I-395 between 6:00 in the morning and 9:00 in the morning, which is the world's largest parking lot. So we have not accomplished anything at all.

And especially when CAFE standards were coming in, we imported 35 percent of our oil. After we have gained all of this what we have done in the last 15 years or so, we are now importing almost 50 percent and using twice as much, three times as much fuel as we used before, even though our standards and our miles per gallon continue to go up. That means we just have to replace them with bigger vehicles.

Now I have a picture here of a new Crown Vic and it is a nice one. I do not know whether the leadership of this Congress wants to be driven around in a Geo or not. I do not think so. I do not think I see one Geo parked out there at the steps of the Senate, not one. And I doubt that there will be.

But this is a nice looking automobile, but they get 27 percent of that automobile that is built outside of this country, so that qualifies them as a foreign automobile and they get credit. That is the only way they can get that automobile on the market.

Now whenever you want to put in some kind of a ratio of cubic meters, how much it will haul or whatever, and I can tell you one thing right now, if I got a three-quarter ton pickup that only weighs—what was the breakoff, 6,500 pounds?

Mr. **Duleep**. I am sorry, sir?

Senator **Burns**. 6,500 pounds and over? I am going to take a real piece of railroad iron and weld under it and I am going to weigh 6,600 and I do not have to get to these standards.

But what happens is, if we try and build a lighter pickup, even though it might be a four-wheel drive, and we take it out on our farms and ranches and our service industries and what do we do? It is sick and sorry and will not pull nothing, so we overload it to that and it only lasts a year.

And you call that efficiency. That is not efficiency. And we cannot compete in the world market today going down that street.

So I guess I am just going to put my statement in there. I think the chairman and Mr. Wallop are on the right track and we should commonsensically approach this thing called CAFE standards.

I just got back from the Middle East. If you want to see something devastating, you just fly over the top and see 500 oil wells on fire. And then you wonder what we are doing here on this and with present technology. And it would be a shame if we happen to set policy that would be 10 years ahead of its time. But right now the Bryan bill does not get it done.

And I say again if we go to sacrificing safety, we are traveling down the wrong street.

So I guess my question is, why are we going through this exercise like we are going through now when basically our two people that are in this bill can sit down and write a bill, probably by themselves and without all this other junk going on, and we would have this thing voted out? I really believe that. I am sincere that we go through it, we spend hours and hours and hours and drafts of studies telling us, it is still going to boil down to it takes X amount of energy to move X amount of pounds from point A to point B, period.

And I am concerned about my pickups because I like to go to roping. And there ain't one pickup, there ain't one of them pickups that can pull a four-horse trailer if we lose them.

Thank you very much.

The **Chairman**. Thank you, Senator Burns.

Senator Wirth.

Senator **Wirth**. Thank you very much, Mr. Chairman.

Mr. Chairman, I want to echo the comments of my colleague from North Dakota, Senator Conrad, thanking you for these hearings and the analysis of the Bryan bill and for the witnesses for their focus and attention on that. I do not think any of us thought the Bryan bill was the be all and the end all and the solution to this.

I think it is very important that the statement be made that we believe that Detroit ought to be pushed and that we ought to get a better performance out of the automobile industry. I think that statement clearly has been made and we are going to work our way through fuel efficiency. And clearly, efficiency and conservation have to be the centerpiece of any realistic energy bill.

What is striking to me and continues to be so, Mr. Chairman, is the fact that we get absolutely no suggestions coming from Detroit. I have not heard any. We put out a Bryan bill as a way of trying to get the debate going out there. We hear very good witnesses today, you all, and we heard witnesses last week, very good testimony.

And we asked today, I do not know if you all were aware of that, we asked our witnesses from Detroit if they would give us suggestions and numbers and they demurred. We are not getting any from them on this issue, anymore, Mr. Chairman, then we were getting them in the past.

I have been through this for a long time. It is unfortunate, this syndrome of the industry just being unwilling to participate. We had that going on in 1975 when I was a freshman member of the House. We did fuel economy standards. Detroit came in and said you cannot do it, do not do it. And we were at 12.5 then. We know that significant changes were made, but the industry said no.

When we were doing catalytic converters, you remember that, Mr. Chairman, and all the battle over clean air, we asked the industry and they said no, you cannot do that. We had automatic crash protection discussions, the industry came in and told us that airbags would never work and they would be hazardous to people driving them and a danger and all that kind of good stuff. And now they are out marketing them. They were not helpful on that front. And now they are out marketing them, about the only thing, I guess, that they are marketing on safety issues.

The industry spent a great deal of time when I had jurisdiction over that part of the Department of Transportation, the National Highway Transportation Safety Administration, NHTSA, the industry was lobbying to gut and get rid of that.

Alternative fuels, we just went through the Clean Air Act and looking at alternative fuels and alternative fueled vehicles and fleets and asked for the industry's help there and they said no.

I mean, it is really a shame, Mr. Chairman, you have a major industry in the United States that is continuing not to be part of this debate. We have another example of that today.

I have no beef for beating up on the industry, it is just a shame we do not get any help from them. I think that these hearings, Mr. Chairman, that you put together and the help from our witnesses this morning and this first panel was very productive. We thank you. Again, I would hope that the industry would come to us and say what they think we ought to do.

My own belief that efficiency is something that ought to be pursuing. One of the reasons that we are in the Persian Gulf is that we are so incredibly dependent upon imported oil. You would gather from the testimony that we are getting from Detroit, that it does not make any difference. Let us import some more oil and get ourselves into a situation. Maybe next time we can send 750,000, rather than 550,000 troops to the Persian Gulf.

I mean, I would hope, Mr. Chairman, that we can get into a situation where we can focus significantly on efficiencies in the transportation industry. I think you all have made some very good suggestions.

I am going to have a couple of questions about what is achievable, and that is important, what is achievable, what is feasible, what is workable. I would hope that we might hear from the industry what they think is achievable and workable and what targets we ought to be looking at other than, no, no, no.

I think if you combine that, Mr. Chairman, with what you have said, we ought to be looking at alternative fuels and be pushing that as hard as possible. I think that is very wise to do. I would hope maybe the industry would help us focus on that as well. We ought to be looking at fleet incentives. We have talked about that.

And we could get help from them on that, the package of alternative fuels and what is reasonable and feasible here. And then looking at the whole incentive question is the kind of a package, I think, we responsibly ought to be putting together for the country.

And, again, I would hope that rather than just a continuing cacophony of negatives, that we would get some help and some positive responses from an industry that, today I gather, is in significant trouble, from everything I can read and are probably going to be in here asking us for some help. Not just to protect them from themselves or the markets, maybe we can get them to be joining up and helping in this process, Mr. Chairman.

Having said that, and I have been here for 17 years now, Mr. Chairman, and the same syndrome has been going on for 17 years.

You have been here longer. I hope we might be able to get some help from them.

Two questions. One, are the standards that you all are talking about based upon or is there a difference between the performance of automobiles in 1990 models? I understand that horse power has gone up significantly from 1987 to 1990. If we were based upon 1987, would this make a difference if we were based upon 1987 performance rather than 1990 performance, would that have any impact on your numbers?

Mr. PLOTKIN. Yes, it would. They would probably go up about another mile per gallon.

Senator WIRTH. And the difference between 1987 and 1990 is essentially increased horse power, is that one of the major differences?

Mr. PLOTKIN. It is size.

Senator WIRTH. What has happened is, instead of becoming more fuel efficient, the fleet from Detroit has become less fuel efficient between 1987 and 1990, is that right? Or has it become more horse power between 1987 and 1990?

Mr. PLOTKIN. It has been a bit of a plateau, I guess. What has happened is that there has been a lot of opportunities to move technology into the fleet, like the four-valve per cylinder engine. And you can take those benefits either in increased performance or increased fuel economy or some combination of the two.

The companies are seeing that consumers are more willing to pay for increased performance than they are to pay for increased fuel economy. So they have used these new engines to increase performance. They have not necessarily paid a fuel economy price, but they have foregone the possibility of getting increased fuel economy.

The CHAIRMAN. If the senator would yield. By companies, do you mean foreign and domestic?

Mr. PLOTKIN. Oh, yes.

Senator WIRTH. And those have been marketed heavily to the American public, right?

Mr. PLOTKIN. Successfully.

Senator WIRTH. That leads then to the second question which relates to incentives and marketing. Do you have any sense of what impact it would be if you really pressed the gas-guzzler, gas-sipper concept and used that as a way of marketing more fuel efficient automobiles so that people who bought more fuel efficient automobiles would be increasingly rewarded for doing so and people on the other side of it who bought less fuel efficient automobiles would effectively be paying a penalty for doing so if, in fact, the national goal is to become more energy independent?

Mr. PLOTKIN. Senator, I know that there have been studies done of this. I have got to admit to you, I have been so focused on this one issue that I have not had the opportunity of really examining them. But there are studies available. I know the Department of Energy has looked at this, and others. I believe, clearly, that incentives like that will work.

The problem, obviously, is how cost effective they are. But I am not prepared to tell you.

Senator **Wirth**. Marketing is important. If, on the one hand you say that automatic crash protection airbags are not going to work and you do not go out and market them, they are not on the market, right?

But if on the other hand, you go out and say this is very good and this is a positive thing, as Detroit is now doing, then people are more alerted to it. You see, the famous Chrysler crash and so on of airbags, Chrysler telling us not long ago that this was a terrible thing to do, as I remember, at least the industry was. You could not have airbags, they would blow up in people's faces and they were dangerous, children would be maimed, the whole load. And now we are seeing it being marketed.

We could market, it seems to me, greater efficiencies, could we not?

Mr. **Plotkin**. Yes. But I will point out one stumbling block here. And that is that there have been times in the past when the industry has tried very hard to market safety.

The **Chairman**. Would you move the microphone a little bit closer?

Mr. **Plotkin**. Sorry, sir.

There have been times in the past when the automobile manufacturers have marketed safety pretty hard. They seem to be succeeding today, but they in general did not succeed in the past. So it is certainly not an absolute truth that if you go out and market something that you are going to succeed.

I would hope that fuel economy can be marketed. It is not being marketed now. But I believe the reason it is not being marketed is because you look and see what gasoline costs, people just do not care that much.

Senator **Wirth**. Mr. Duleep, do you have any comments?

Mr. **Duleep**. I think one of the major stumbling blocks in that is, if it is just based strictly on fuel economy, it involves transfer of money from largely the domestic manufacturers to the importers. That is, you tax the domestics on the whole on average and then hand the money over to the import manufacturers, and there are a lot of people who are quite upset by that idea, I think.

Senator **Wirth**. I would agree. I would be upset by that. I own only domestic automobiles. But what is the answer? Is there a way in which you can encourage people?

Mr. **Duleep**. Sir, I believe in California that is a proposal where that subsidy is written on market class, so based on the average, say, for intermediate-sized cars, if you are better than average for an intermediate car, then you get a rebate and if it is worse you pay a tax, so it is by size class, and this eliminates the cross-subsidies, or cross-size classes. That is one idea that is being pursued that I know of.

Senator **Wirth**. Well, I would appreciate any comments you might have, Mr. Plotkin. Maybe you all can go back and look at those studies done by DOT and give us—if you have any expertise in that, or anybody who could do that, I would certainly appreciate your comments on that.

Mr. **Plotkin**. Forgive me for laughing, Senator, but I am a bit of a one-man shop there. I would like to do that. I have got to tell you, I see no way of doing it in the foreseeable future.

Senator **Wirth**. Maybe we can get that from elsewhere. Again, thank you, Mr. Chairman. I again would urge our colleagues from the industry to come in and give us a hand on what I think is an important national issue. Presumably fuel efficiency, you know, is something that we ought to be concerned about.

The **Chairman**. Well, they are getting ready to testify on the next panel, and you can tell them.

Senator **Wirth**. They are here.

The **Chairman**. Senator Wellstone.

Senator **Wellstone**. Thank you, Mr. Chairman. Many of the questions that I had have been asked. Let me just try and move on to a few that I do not think I have been asked, or some ground that has not been covered.

We have talked about the 1996 target, and Senator Wirth just talked to you some about rebates fees and how those incentives might be built in, and some of your response. Let me go to the 2001 targets and beyond.

As I understand it, the OTA analysis includes only technologies that are now available, but 10 years from now, if we had some congressional mandate my guess is that there would be a number of new technologies that would be introduced. I know, you know, how much work you put into the here and now, but I wonder whether—it would be helpful to me if you could speculate about how much an increase in fuel economy might result in 2001, 2010, if these new technologies were introduced. What would it mean?

Mr. **Duleep**. Senator, we have actually looked at very precisely that question, and there are a number of technologies that we know exist today that were not utilized in the analysis. I think Mr. Plotkin has mentioned the two-stroke engine as being one that everyone is working on. There is another technology——

Senator **Wallop**. Mr. Duleep, excuse me. Is there not some concern at least, now, that the two-stroke engine may not be able to meet the tier 2 environmental standards?

Mr. **Duleep**. Sir, there was an SAE—Society of Automotive Engineers—show 2 weeks ago, and the company that is pioneering the two-stroke, which is an Australian company called R. Biddle, had some public information that indicated they can even meet the tier 1 standards, at least in light cars. Whether that is true or not, I cannot say, but at least the public information seems to be that it has met the standard.

Senator **Wallop**. But as I understand it, there is——

Mr. **Duleep**. There may be some concerns, and this is obviously based on just one data point, and I cannot confirm it.

Senator **Wallop**. But tier 1 would imply abandoning tier 2.

Mr. **Duleep**. They suggest they can meet tier 2, but they have not met it yet.

But to go on to another one, there is also the possibility that the turbo-charged diesel engine, which is now used in the Mercedes-Benz cars and some Volkswagens, could come back into the market and that provides phenomenal gains in fuel efficiency.

Its problem is that it cannot meet the NO_x standard. The Clean Air Act has a special provision to allow diesels an exemption to the particular standards so that whether that exemption will continue or not is not clear, but certainly that is another possibility.

Then two or three other possibilities that Mr. Plotkin mentioned are drive-by-wire, which essentially is an electrical connection from the throttle to the control of the engine rather than a rigid mechanical connection, so there are a number of technologies like that, and the reason we have not included them is because there is a certain risk that they may never meet applicable emission standards or consumer acceptability.

Senator WELLSTONE. What would these new technologies translate into, in terms of miles per gallon? 1 mile, 5 miles per gallon?

Mr. DULEEP. The two-stroke engine is somewhat unusual. It probably will not change the numbers, but it will make the cost much lower. That is, instead of using all this technology to improve the four-stroke and having it cost so much, the two-stroke might meet that same goal but at much lower cost. So we do not foresee that there is a large fuel economy advantage over this very advanced four-stroke that we are hypothesizing for 2001.

The turbo-charge direct injection diesel is something that can provide an additional 15 to 20 percent gain in fuel economy even over the advanced gasoline engine that we have postulated, so that compared to a current gasoline engine it is perhaps 30 to 35 percent better, and that has tremendous potential but it also has some problems.

Mr. PLOTKIN. Can I add to that?

You asked the question about the time frame. The problem with getting a lot of fuel economy gains in a short period of time with these technologies is that normally, the way you introduce a new technology into the fleet is to introduce it only into one or two models and then let it be in the fleet for 2 or 3 years, at least, to work all the bugs out, because just the testing itself still leaves a very substantial amount of risk. What happens when you actually get this technology into service?

So that before you can even really start moving the technology well into the fleet, you have got to give it some time to be in the fleet a little while in one model or two models. By the time you have factored all these lead times into effect, the year 2001 or 2002 probably does not give you a lot of potential for new fuel economy. You may be able to get a few miles per gallon from several technologies combined.

On the other hand, if you go out another 5 or 10 years to the year 2010, then a lot of things open up for you, because you can get very substantial penetration of those technologies in that time frame.

So the numbers you are talking about then begin to look much, much higher. In fact, they make the Bryan proposal for 2001 look rather modest at 2010, but you have got to give these things time to develop, otherwise you run very, very high risks.

Senator WELLSTONE. That is very interesting. Let me shift to the here and now, 2010 back to your testimony today. The purpose of the CAFE legislation is we want to have fuel-efficient vehicles out on the road and we want to have them out on the road as soon as possible, meeting the kind of standards that the Chairman has mentioned.

I am a little disturbed about some of the "gaming" that we read about in some of the testimony to come, and some of the credits—

like, for example, credit for air bags, which I think air bags is in and of itself very good, or alternative fuels, which I think is also good but which might be used to essentially—they might undercut the CAFE standards, can be used as a substitute.

I wonder whether you could discuss for me the kinds of credits already included in the legislation, what additional ones we might be asked to consider, and your overall judgment about these credits as to whether or not they are going to undercut, really what CAFE is all about or not, and if so, what should we do to make sure that the purpose of CAFE is not really weakened?

Mr. **Plotkin**. The key credit is the alternative fuel credit for flexible fuel vehicles, which would be the most likely vehicles to be manufactured in large numbers over the next few years. There is a cap of 1.2 miles per gallon. No matter how many of those you build, you cannot get a total credit of greater than 1.2 miles per gallon.

There has been some talk of lifting the cap. The problem with lifting the cap, of course, is that you may end up with lots of these vehicles out there with very little alternative fuel supply, so you have spent a lot of money for very little, and you have also lost some of the fuel economy gains you had hoped to get with the new CAFE standards.

Obviously, if there are other measures done side-by-side with these credits to make sure that there is a fuel supply out there, then you may not be sacrificing a lot in the area of backing out oil out of the transportation system by lifting the cap.

The problem is that there are other issues involved, such as global warming, which will suffer in that regard. That is, if you trade off getting alternative fuels for getting higher fuel efficiency, then you are going to end up not getting the kind of gains in global warming emissions that you had hoped to get with the new CAFE standards.

The **Chairman**. Would the Senator yield at that point? Can you tell us what the cost of building an alternative fuel vehicle is, compared to getting max tech to yield the same kind of MPG?

Mr. **Duleep**. I believe on a per-MPG basis, a flexible fuel vehicle is very cheap—the dual fuel type vehicle.

The **Chairman**. That would be gasoline and——

Mr. **Duleep**. Some mixture of methanol and gasoline, or something like that, or alcohol and gasoline, because that immediately increases the fuel economy—the CAFE-rated fuel economy—by close to 50 percent, and the consumer cost is in the range of $200 to $300 per car, so you get a huge MPG impact for a relatively small price, in fact, so it is the cheapest form of CAFE relative to technologies that actually improve fuel economy.

The **Chairman**. So you can be sure, in effect, that all the companies are going to take max advantage of the alternate fuels gaming method, at least up to 1.2, and if you took the cap off they would probably go far beyond.

Senator **Wellstone**. Mr. Chairman, this is the question for me that I am trying to understand. I mean, I think the greenhouse effect is a major challenge for all of us that are world citizens, and I feel very strongly about it, and I think moving to alternative fuels is in and of itself a positive thing.

I just do not quite know why we want to achieve it this way, when I think it is somewhat a separable issue from fuel efficiency standards. We could mandate it, we could do it a number of different ways. Why is it mixed in? Why would this be the trade-off?

The CHAIRMAN. This way, it does not cost any money.

Mr. PLOTKIN. I know why. Because you do not have to tax it. You do not have to subsidize it. In some ways, this is a Government subsidy without the Government picking it up in the budget. That is why it is done this way.

Senator WELLSTONE. But it seems to me to be—I mean, that may be the reason why, but in the best of all worlds, you know, I like to think about desirability. I still think that we are making a mistake here in terms of two objectives we are trying to reach, both of which are equally important.

Mr. PLOTKIN. I am not supposed to comment on issues like this. I am supposed to be an objective observer.

Senator WELLSTONE. Well, I am supposed to ask questions about issues like this.

Mr. PLOTKIN. Ask me a technical question.

Senator WELLSTONE. But I am not a technical person. Remember, you said values. Public policy choices.

Mr. PLOTKIN. Okay. But my job is to not impose my own values on this. That is why some of these questions become very difficult. Sorry.

Senator WELLSTONE. Mr. Chairman, help me out here.

The CHAIRMAN. I appreciate Mr. Plotkin's review here, because one thing we have now when Senator Wirth was talking about the companies. We have now an OTA that can come in and give us an independent voice.

But to be independent, I think he cannot pick sides in this controversy. I mean, really what he needs to do is give us the material on which to make the decisions, and those questions where he has already answered, plus all those written ones that we are going to inundate him with—will hopefully give us the facts on which to make that value judgment.

Senator WELLSTONE. I appreciate that. But I really needed to raise the question, because I think it is a real critical one. Just information—in the Bryan proposal, and I am sorry for not being right up to date on this—are airbags included as a credit or not? Do you know?

Mr. DULEEP. I do not know.

Senator WELLSTONE. Thank you, thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much, Senator Wellstone.

Gentlemen. thank you very much indeed.

Senator WALLOP. Mr. Chairman, quickly before they go. Mr. Plotkin or Mr. Duleep, do you have information as to what the existing CAFE standards have done about per capita fuel consumption in the United States.

Mr. PLOTKIN. Senator, there is a raging argument about what these existing CAFE standards have done. I do not have the exact data, but I think it is important for me to say that there are those out there certainly in the automobile industry who claim the CAFE standards have really done very little with regard to lowering—to improving fuel economy. And there are others who say that they have done a tremendous amount.

Senator WALLOP. My question really is not directed toward that. It is not whether they have done anything about improving fuel economy. I think probably it is demonstrable that they have, but whether it has done anything—whether there has been a significant change in per capita fuel consumption.

Mr. PLOTKIN. The problem here is that if nothing had happened, if fuel economy had been absolutely stable, the amount of gasoline that had been used would keep on going up and up and up, because people are driving more. And of course, also there are more drivers. What this has done is it has managed to level this off so that instead of what we might have expected—an ever-increasing use of gasoline—we have managed to suppress a lot of that with these standards. So it is not as if—the standards have not allowed us to dramatically reduce gasoline consumption. But they have allowed us to stop the growth.

Senator WALLOP. Thank you.

The CHAIRMAN. Gentlemen, thank you very much indeed.

Next we have a panel consisting of Ms. Marina Whitman, vice president and group executive for public affairs of General Motors; Mr. Ron R. Boltz, vice president for product strategy and regulatory affairs of Chrysler; Peter Pestillo, vice president, corporate relations at Ford; James Olson, vice president at Toyota, U.S.A.; and John DeCicco, research associate for the American Council for an Energy Efficient Economy. He is accompanied by Howard Geller, executive director.

Ladies and gentlemen, thank you very much. I want to say, Mr. DeCicco, thank you very much for providing staff with an analysis of the fuel-saving controversy, whether the Bryan bill saves 0.5 million barrels a day or 2.5 million barrels a day. I will place that analysis in the record.

[The material referred to follows:]

American Council for an
Energy-Efficient Economy

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TECHNICAL MEMORANDUM 19 March 1991

By: John DeCicco

Re: Sensitivity analysis of oil savings projected for new CAFE standards.

This memorandum discusses the effect of various assumptions on the projected oil savings that would occur if strengthed Corporate Average Fuel Economy (CAFE) standards are implemented for automobiles and light trucks in the United States. The analysis is done for the level of standards proposed in S. 279 of the 102nd Congress, which proposes increases in CAFE by manufacturer of 20% by 1996 and 40% by 2001, relative to a base year of 1988, along with other provisions and qualifications. In a brief paper entitled "Savings from CAFE" (12 February 1991), ACEEE provided an estimate of 2.5 Mbd (millions of barrels per day) in 2005 for the oil savings from S. 279. This estimate is for unadulterated standards, that is, assuming that the standards are implemented according to their full intent, without rollbacks or amendments that might weaken their effect, and assuming that in the absence of the proposed standards there are no increases in fuel economy above the current levels, i.e., frozen efficiency.

Part 1 of this memorandum summarizes the effects of amendments, rollbacks, and complementary policies which can impact CAFE. Part 2 gives a comparison with the CAFE savings estimates claimed by the Department of Energy.

1 EFFECTS OF POLICY CHOICES AND OTHER FACTORS

Various policy choices and other factors which can affect the achieved CAFE levels are discussed here. Each factor is first examined in isolation; a summary table is then given which illustrate the combined effects of the factors analyzed.

1.1 Administrative discretion

Under the provisions of S. 279 for "Modifications of Standards," in response to petition or of its own initiative, the Department of Transportation may conduct a rulemaking proceeding in order to determine a maximum feasible average fuel economy for the years covered by the standard. Reductions in standards specified as the outcome of such a proceeding are known as "rollbacks," such as happened during the course of the present CAFE standards. S. 279 limits the CAFE rollbacks to not less than a 15% improvement in 1996 and not less than a 30% improvement in 2001, relative to the 1988 base year. If the standards are rolled back to the maximum extent and the reduced standards are exactly met, the new car CAFE would reach 37 mpg in 2001. In 2005, there would be a 20% reduction the annual savings, from 2.5 Mbd down to 2.0 Mbd.

The guidelines of S. 279 also allow that the outcome of a rulemaking proceeding might increase the standard above the nominal levels of 20% in 1996 and 40% in 2001. Although no upper bound is placed on the maximum standard level, raising the standard to a 60% increase by 2001 provides a useful scenario for comparison.[1] In this case, the new car CAFE would reach 45 mpg and the oil savings would be 3.1 Mbd in 2005, a 24% increase in savings over the nominal S. 279 level.

1.2 Flexible fuels credit

The Alternative Fuels Act of 1990 provides a CAFE credit for manufacturers who include vehicle capable of running on certain alternative fuels (such as methanol or ethanol blends). The credit is currently limited to 1.2 mpg for a corporate fleet. This credit takes effect whether or not any alternative fuels are actually used in the flexible fuel vehicles. Assuming that all manufacturers can take full advantage of this credit from 1996 onward, the average new car CAFE would be 39 mpg (rather than 40 mpg without the credit). Oil savings in 2005 would be 2.2 Mbd, a 12% reduction from level without flexible fuels credit, unless significant quantities of alternative fuels are actually used. If the current cap on the flexible fuels credit is raised, as proposed in S. 341 and the administration's National Energy Strategy, the savings from CAFE will erode even further.

A flexible fuel credit without a provision for validating that alternative fuels are actually used in the vehicles is a poor idea, because it reduces overall fleet fuel economy without insuring any oil displacement. Furthermore, a flexible fuel CAFE credit is counterproductive to ultimate goals of introducing alternative fuels, because the success of alternative fuel vehicles will be partly dependent on their efficiency, and many of the efficiency technologies that apply to gasoline or diesel powered vehicles will also apply to alternatively fueled vehicles.

1.3 Truth in testing

There is a significant and growing discrepancy between the rated fuel economies of light vehicles and the fuel economies actually experienced by consumers. The discrepancy (gap) between the two was estimated to be about 15% in 1986 and is projected to reach 30% by 2010.[2] The gap is caused primarily by congestion, as well as an increasing share of urban driving and higher highway speeds. Presently the gap is about 20%, which means that even though the 1990 new car fleet has an average EPA rating of nearly 28 mpg, the on-the-road fuel economy of the new cars is actually closer to 23 mpg. Closing the gap by requiring that a new test procedure be developed and phased in, so that the rated fuel economy matches the on-road performance, would yield significant increases in oil savings. A truth-in-testing phase-in aimed to completely close the gap by 2010 would, in combination with a 40% increase in rated fuel economy by 2001, yield savings of 4.1 Mbd in 2005, a 64% increase over the savings from CAFE-40 alone.

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[1] A 60% improvement by 2001 is proposed by H.R. 446. That such a level might be feasible is supported by the "technology group 2" analysis of Ross and Ledbetter (1990).

[2] Westbrook, F., and P. Patterson. Changing driving patterns and their effect on fuel economy. Presented at the 1989 SAE Government/Industry Meeting, Washington, DC, May 1989.

1.4 Gas-guzzler/gas-sipper fee/rebates

Extentions of the present gas guzzler tax to a gas-guzzler/gas-sipper fee/rebate incentive system are being discussed as a policy complement to CAFE. Such incentives to influence car buyers preference for fuel economy can be a useful in lowering the risk to manufacturers who are concerned consumer demand for their more efficient models. A practical fuel economy-related fee/rebate system is likely to have a small effect relative to a 40% CAFE improvement, so it must be viewed as a complement to CAFE, not a replacement. Various proposals, some modeled after the DRIVE$^+$ program developed in California, have been put forward. We have not done a full analysis of the fuel savings impact of such a fee/rebate system, but have made rough calculations to estimate the magnitude of the effect. Assuming that such a system results in a 5% improvement in achieved CAFE levels by 2001 rising to 10% by 2010, the additional savings in 2005 would be 0.34 Mbd, or a 13% improvement over the savings from CAFE alone.

1.5 Timing of savings

Because the average lifetime of automobiles is about 11 years (that of light trucks is longer), savings from new CAFE standards are not fully realized until some time after the standards take effect. Figure 1 shows the increase in oil savings rate (Mbd) and the accumulated savings (billions of barrels) for S. 279 in the absence of delays, weakening policies, or truth-in-testing. No further increase in standards is assumed after 2001, and the estimates are given relative to new car and light truck efficiencies frozen at 1990 levels. Delays in the standards would have the effect of shifting the curves to the right, so that comparable savings are achieved in a later year.

1.6 Other effects

Other factors which can impact the effect of CAFE include the following.

(a) Changes in market shares by various manufacturers. Our analysis holds market shares, as well as size and performance characteristics, constant at 1988 levels. Changes in consumer tastes, marketing strategies of manufacturers, as well as changes in prices, and other exogenous factors, could result in different mix of vehicles by 2001. The effect of a percentage increase approach is less predictable than that of a fixed standard. For example, if manufacturers of fleets that are now more efficient than average gain market share, the savings will be higher; the converse is also true. We have not attempted to examine this effect; however, we believe it is very unlikely that it would be large enough to have a major impact on the fuel savings from CAFE.

(b) CAFE carry-forward credits. To the extent that some manufacturers' CAFE levels are greater than that required and they can carry a mpg credit forward to reduce their required targets in years specified by the standard, there will be a delay in achieving the full percentages increases desired in 1996 and 2001. The savings reached in those and subsequent years will therefore be lower, although the mandated levels will eventually catch up as credits are exhausted. In any case, the effect is to delay rather than ultimately reduce the achievable level of savings.

(c) Changing the "floors" and "ceilings" which give mininum and maximum required levels for each manufacturer. Our analysis includes the effect of the stated ceilings in S. 279 (45 mpg for cars and 35 mpg for light trucks in 2001); removing these ceilings would increase the savings by about 4%. The effect of the floor (minimum required CAFE) was not addressed, but it is expected to be similarly small. There is, in fact, a continuum of floor and ceiling levels consistent with a 40% improvement in fuel economy. In the limiting case, the floor meets the ceiling at a single standard for all manufacturers, like the earlier CAFE standards. Tightening the floor and ceiling boundaries could be considered as a way to change the balance of the burden among manufacturers presently having lower or higher fleet ratings. It would also make the standard more robust with respect to the changes in market shares noted above.

(d) Changes in the overall amount of driving. Total vehicle miles of travel can be decreased by policies to reduce the need for motor vehicle travel, increase vehicle ridership, or increase alternate modes of travel. We have not attempted to analyze such exogenous VMT effects. (See the discussion below, in Section 2, regarding the VMT rebound effect postulated by DOE.)

(e) "Zero overshoot" refers to assuming that manufacturers exactly meet their CAFE targets, rather than exceed them by a "safety margin." Historically, in attempting to meet CAFE standards, manufacturers have exceeded CAFE targets with a safety margins of about 0.7 mpg for passenger cars and 0.2 mpg for light trucks. This mpg "overshoot" was assumed in modeling the new CAFE levels. The effect of this safety margin is small; if target standards were reached exactly, there is a 4% reduction in savings.

1.7 Summary table

The following table summarizes the effects that have been quantified.

Effects of various factors on the oil savings in 2005
projected for a 40% CAFE increase by 2001

	CAFE (mpg)	Savings (Mbd)	Percent difference
ACEEE estimate for 40% CAFE increase	40.5	2.5	0
Variations:			
(1) Zero mpg overshoot	39.9	2.4	-4%
(2) Rollbacks to S. 279 limits and (1)	37.4	2.0	-20%
(3) Flexible fuel credits and (1,2)	36.2	1.8	-28%
(4) Truth in testing and (1,2,3)	36.2	3.5	+40%
(4) Fee/rebate incentives and (1)	42.0	2.8	+13%
(6) Fee/rebate incentives and (1,2,3)	38.0	2.1	-18%

2 COMPARISON WITH DOE ESTIMATES

Subsequent to the introduction of S. 279, the Bush administration, through the Department of Energy, stated that savings from S. 279 would be only 0.5 Mbd. An immediate question, therefore, is to account for the very large (factor of five) discrepancy between this estimate and the nominal estimate of 2.5 Mbd made by ACEEE. The following table summarizes the answer to this question. It is presumed that DOE used the "zero overshoot" assumption discussed earlier; this small effect is noted first to keep subsequent comparisons on a common footing.

Effect of negating assumptions on the oil savings in 2005
projected for a 40% CAFE increase by 2001

	CAFE (mpg)	Savings (Mbd)	Percent difference
ACEEE estimate for 40% CAFE increase	40.5	2.5	0
Adjustments:			
(1) Zero mpg overshoot	39.9	2.4	-4%
(2) DOE market mpg increase and (1)	39.9	0.9	-64%
(3) VMT "rebound" of 20% and (1)	39.9	1.9	-24%
(4) Flexible fuel credits and (1)	38.9	2.2	-12%
Combined adjustments (1,2,3,4)	38.9	0.5	-80%
(5) DOE VMT base and growth and (1)	39.9	2.1	-16%
All negating adjustments (1,2,3,4,5)	38.9	0.4	-84%

By far the largest source of discrepancy is DOE's assumption that market forces will induce significant increases in fuel economy even in the absence of new CAFE regulation. DOE's projected increases for cars are 33 mpg by 2000 and 37 mpg by 2010, with a comparable rate of improvement for light trucks. On the other hand, new fleet fuel economies are currently on a declining trend, after having peaked in 1988. Oil prices remain low in spite of the recent transient instability; the future price is difficult to predict. New taxes that might significantly increase the consumer price for gasoline do not seem to be in the works. For these reasons, we feel that frozen efficiency is a much more credible reference for estimating the savings from new CAFE standards.

The second largest source of discrepancy is the so-called "rebound" effect. DOE assumes an elasticity of 20% for VMT with respect to fuel economy, i.e., that each 10% increase in fuel economy results in a 2% increase in VMT because of the lowered cost of driving. By this reasoning, the 40% increase in 2001 would result in an 8% increase in VMT relative to frozen efficiency. Recalculation of the VMT growth using this high value for the elasticity, with both my original VMT series and the DOE's own VMT series, shows that a 20% "rebound" effect lowers the projected savings by a similar amount, as shown in the table. In our judgement, the 20% rebound assumed by DOE strains credibility. A recent review places the average estimated value at about 10% based on past history,[3] but also notes that the expected value is declining. This follows common sense, since fuel costs now amount to only about 12% of total cost of owning and operating an automobile, and this cost share will continue to decrease as fuel economy increases. For the 2001-2010 time frame, with new CAFE standards, we take 5% to be a more credible value for any possible rebound effect, with a similarly small impact on the savings from CAFE.

Flexible fuel credits were discussed in part 1; if available, it is likely that manufacturers will take full advantage of them to the extent that adapting a vehicle for flexible fuel use is cheaper than improving fuel economy. This is the only adjustment made by DOE which we feel is reasonable. As noted earlier, ACEEE believes that flexible fuel credits against CAFE are a poor way to further the introduction of alternative fuels.

A final source of discrepancy is a differing basis and growth rate for vehicle miles of travel (VMT). ACEEE's VMT numbers start from a higher base (due mainly to the use of different survey data) and grow more rapidly in earlier years (due mainly to a higher population growth rate than assumed by DOE). The projected VMT difference in 2005 is about 16%, which directly affects the savings estimate.

In summary, the main sources of difference between the ACEEE and DOE estimates of the savings from new CAFE standards relate to the assumed growth in fuel economy in the absence of new regulation and the rebound effect. We dispute the magnitude of both of these adjustments and feel that our estimate much more closely represents the savings expected from a new CAFE-40 standard. As noted in our "Savings from CAFE" statement, there is always uncertainty in making such projections into the future. We stated then, for our nominal estimate of 2.5 Mbd savings (from "unadulterated" CAFE-40), that the range of certainty was between 2.0 Mbd and 3.0 Mbd. We have not been made aware of information that would lead us to revise this confidence level, which we feel is sufficient to guide policy makers regarding the benefits of new fuel economy legislation.

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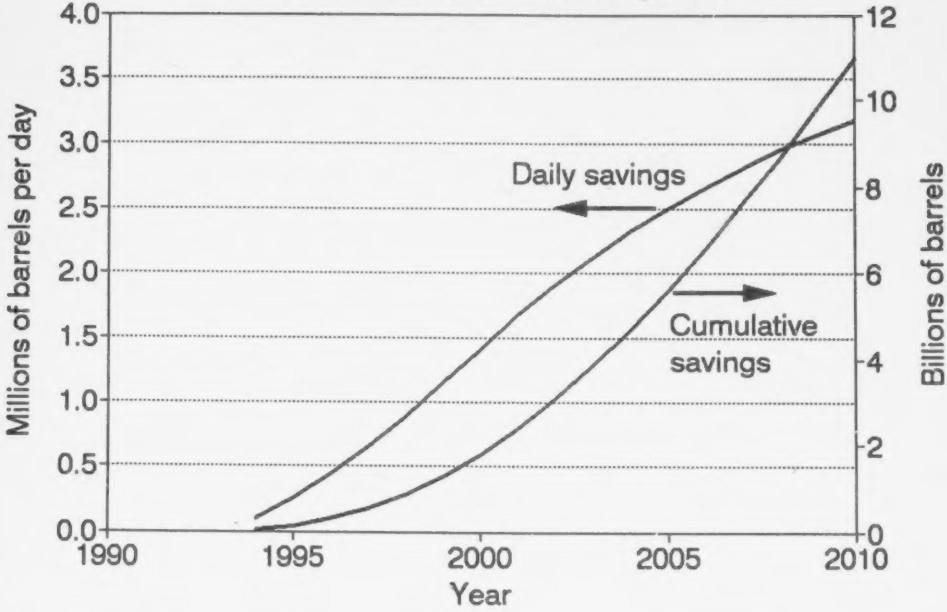
[3] Greene, D.L. Vehicle use and fuel economy: How big is the "rebound" effect? Draft paper, Center for Transportation Analysis, Oak Ridge National Laboratory, February 13, 1991.



Growth in daily and cumulative savings from CAFE 40% increase by 2001

The CHAIRMAN. So, let us begin with Dr. Whitman.

STATEMENT OF DR. MARINA v.N. WHITMAN, VICE PRESIDENT AND GROUP EXECUTIVE, PUBLIC AFFAIRS AND MARKETING CORP., GENERAL MOTORS CORP.

Dr. WHITMAN. Thank you, Mr. Chairman, we are pleased to have the opportunity to return to this committee for a second hearing on corporate average fuel economy standards for passenger cars and light trucks.

I will briefly summarize our main points. We commend you and Senator Wallop for proposing a bill that deals with energy issues in a comprehensive fashion. Your committee is aware of the more than the 125 percent improvement in the fuel economy of GM's passenger car fleets since the mid-1970's, and that these improvements have occurred because customers have decided to purchase the fuel-efficient new cars and trucks we have been producing.

Looking to the future, our efforts include working with government agencies at the State and Federal levels to demonstrate vehicles using alternative fuels, to improve battery technology for electric vehicles, and to develop intelligent vehicle highway systems to reduce both the consumption of energy and the pollutants caused by congestion. And I cannot help adding, Senator, that yes, we are being positive on many of the things Senator Wirth raised. And this is only some of the examples of ways in which we are indeed putting our money where our mouth is on these issues.

We continue to believe the CAFE program is not an effective means to promote energy conservation. It does not affect what consumers want to buy or how they use their vehicles. That is one of the reasons many experts have suggested consideration of a broadly based energy charge as the most effective and least costly means of encouraging accelerated energy conservation.

Experience under the current CAFE program demonstrates and the provisions of Senate bill 341 reflect how difficult it is to set an appropriate CAFE standard. It involves critical assumptions relating to such issues as current and future technology, economic practicability, the future price of oil, the appropriate size and mix of vehicles, the level of performance consumers will expect from their vehicles, and the impact of future emissions, safety, and other regulatory requirements.

However, if the CAFE approach is pursued, we urge reliance on a rulemaking process to determine appropriate standards. A rulemaking approach would allow for detailed consideration of the assumptions and factors that go into setting CAFE levels.

We also support approaches such as the concept of percentage increases in S. 341 that might mitigate some of the disadvantages that the current CAFE program imposes on full-line manufacturers and their employees.

The rapid gains in fuel economy made over the last 15 years have been due importantly to weight reductions of about 1,000 pounds made possible in part by implementation of front-wheel drive as well as to reduced aerodynamic drag, reduced tire rolling resistance, and other technological improvements. The fuel economy benefits from the reduction in weight, together with the switched front-wheel drive are one-time gains, and therefore, future improvements must come from other sources.

The history of the motor vehicle industry shows that significant technological improvements, such as reduced tire rolling resistance and automatic transmissions with lock-up converter clutches, are usually incremental and are implemented over an extended period of time, as long as 10 to 20 years, depending on the complexity of the technology and the cost to the consumer.

If a potential fuel-saving technology is not now incorporated in a massed produced vehicle, it is not likely to be in wide-spread usage at the turn of the century. It is fair to assume that if unexploited technological improvements were on the horizon, commercialization of such technologies would be expected first in overseas markets for gasoline prices are from two to four times as high as they are in the U.S.

Instead we find that while the average fuel economy of new cars in such countries is somewhat higher than is the case in the U.S. This difference is explained by the fact that in these countries, small cars constitute a much larger share of the fleet, and typically lack many of the features that American drivers have come to expect, such as automatic transmissions and air conditioning.

As others have noted, one of the critical questions about CAFE is what makes sense economically. Our major concerns about the studies of technological feasibility relate to their treatment of economic issues, their optimistic assessments of the costs and the timing of implementation, and their failure to take into account such issues as marketing and safety risks and the engineering, manufacturing, financial, and other resource constraints facing producers.

In a regulatory context, we believe economic issues would best be addressed by retaining the economic practicability criterion that current law requires be considered in determining maximum average fuel economy. Under current law, the Department of Transportation has assessed economic practicability in terms of whether a proposed CAFE standard is within the financial capability of the industry and would not cause substantial dislocation such as major reductions in sales, employment or competition in the industry or in the U.S. economy as a whole.

We also support the concepts included in S. 341 that are intended to make the CAFE program more flexible and cost effective such as credit carried forward and credit trading, removal of the unlawful conduct provision, and removal of the cap on credits for vehicles that use alternative fuels. And we are encouraged by the proposed incentives for early retirement of older, less fuel efficient vehicles, because this begins to recognize the role these vehicles play in fuel consumption.

Finally, Mr. Chairman, setting CAFE standards is a complex undertaking fraught with great uncertainties about what is possible and what the impact might be on the industry, employment, highway safety, and consumer satisfaction. If a CAFE approach is pursued, we believe it is important to rely on a rule-making process. This also would allow for consideration of the results of the study by the National Academy of Sciences.

A wrong step in setting CAFE standards would have profoundly adverse effects without advancing the energy security interests of the United States.

Thank you.

[The prepared statement of Dr. Whitman follows:]

Statement of
General Motors Corporation
Submitted to the
Senate Committee on
Energy and Natural Resources

Presented by

Dr. Marina v.N. Whitman

Vice President and Group Executive

Public Affairs and Marketing Group

March 20, 1991

Washington, D.C.

Thank you, Mr. Chairman, we are pleased to have this opportunity to return to this committee for this second hearing on Corporate Average Fuel Economy standards for passenger cars and light duty trucks. I will briefly summarize our main points.

We commend you and Senator Wallop for proposing a bill that deals with energy issues in a comprehensive fashion.

Your committee is aware of the more than 125 percent improvement in the fuel economy of GM's passenger car fleet since the mid-seventies and that these improvements have been accomplished because customers have decided to purchase the fuel efficient new cars and trucks we have been producing. Looking to the future, our efforts include working with government agencies at the state and federal levels to demonstrate vehicles using alternative fuels, to improve battery technology for electric vehicles and to develop intelligent vehicle-highway systems to reduce both consumption of energy and the pollutants caused by congestion.

We continue to believe the CAFE program is not an effective means to promote energy conservation — it does not affect what consumers wish to buy and how they use their vehicles. That is one of the reasons we and others have suggested that, if the nation is to encourage further energy conservation, consideration should be given to imposition of a broadly based energy fee as a more effective and less costly means.

Experience under the current CAFE program demonstrates and the provisions of S. 341 reflect how difficult it is to set an appropriate CAFE standard. It involves critical assumptions relating to such issues as current and future technology, economic practicability, the future price of oil, the appropriate future size and mix of vehicles, the level of performance consumers will expect from their vehicles and the impact of future emissions, safety and other regulatory requirements.

However, if the CAFE approach is pursued, we urge reliance on a rulemaking process to determine appropriate standards. A rulemaking approach would allow for detailed consideration of the assumptions and factors that go into setting CAFE levels. We also support approaches, such as the concept in S.341 of percentage increases, that might mitigate some of the disadvantages that the current CAFE program imposes on full-line manufacturers and their employes.

The rapid gains in fuel economy made over the last fifteen years are due importantly, to weight reductions of about 1,000 pounds (made possible in part by implementation of front wheel drive) as well as to reduced aerodynamic drag, to reduced tire rolling resistance and other technological improvements. The fuel economy benefits from the reduction in weight and the switch to front-wheel drive are one-time gains and, therefore, future improvements must come from other sources.

The history of the motor vehicle industry shows that significant technological improvements, such as reduced tire rolling resistance and automatic transmissions with lock up converter clutches, usually are incremental and are implemented over an extended period of time — as long as ten to 20 years, depending on the cost to the consumer and the complexity of the technology. If a potential fuel saving technology is not now part of a mass produced vehicle, it is not likely to be in widespread usage by the turn of the century.

It is fair to assume that if technological improvements were on the horizon, commercialization of such technologies would probably be expected first in overseas markets where gasoline prices are from two to four times as high as they are in the U. S. Instead, we find that while the average fuel economy of new cars in such countries is somewhat higher than is the case in the U.S., this difference is explained by the fact that in these countries smaller cars constitute a much larger share of the fleet and typically lack many of the features that American drivers have come to expect, such as automatic transmissions and air conditioning.

As others have noted, one of the critical questions about CAFE is what makes sense economically. Our major concerns about the studies of technological feasibility have been their treatment of economic issues — their optimistic assessment of costs and timing of implementation, and their failure to account for issues such as marketing and safety risks and the engineering, manufacturing, financial and other resource constraints facing producers.

In the regulatory context, we believe economic issues would best be addressed by retaining the "economic practicability" criterion that current law requires be considered in determining maximum feasible average fuel economy. Under current law, DOT has assessed "economic practicability" in terms of whether a possible CAFE standard is within the financial capability of the industry and would not cause substantial dislocations, such as major reductions in sales, employment or competition, in the industry or the economy as a whole.

We also support the concepts included in S. 341 that are intended to make the CAFE program more flexible and cost effective — such as credit carry forward and credit trading, removal of the unlawful conduct provision and removal of the cap on credits for vehicles that use alternate fuels. And we are encouraged by the proposed incentives for early retirement of older, less fuel efficient vehicles because this begins to recognize the role these vehicles play in fuel use.

Finally, Mr. Chairman, because setting CAFE standards is a complex undertaking, fraught with great uncertainties about what is possible and what the impact might be on the industry, employment, highway safety and consumer satisfaction, we believe it is especially important that action in this area await completion of the study by the National Academy of Sciences. A wrong step in setting CAFE standards could have profoundly adverse effects without advancing the energy security interests of the United States.

The CHAIRMAN. Thank you very much, Dr. Whitman.

Before we hear from Mr. Boltz, let me just say to all witnesses that I want to invite you to respond to Mr. Plotkin and Mr. Duleep. I think you could see that before this committee they have rather high credibility. And your full statements will be in the records, so to the extent that they have something there with respect to engineering, technical analysis, lead time, financial constraints, consumer preferences, re-tooling investments, discontinued models, et cetera, et cetera. To the extent that you disagree with that, you might let us know today or if you would like time to think about it, send us your response because we would like to know that.

Let me also say I think the realities of the politics of this situation are that we will probably need to go to some-miles per gallon. What I foresee and Senator Wallop—and I and the committee are going to have to talk about this—but what I foresee is probably, you know, to tell the transportation industry to come up with a study but to have a minimum miles per gallon achievable based upon those factors which I mentioned earlier of keeping markets, keeping employment, but stretching Detroit to the utter edge and having OTA make the study with that minimum. And perhaps we should also vary according to the years of reaching the goals rather than just vary the miles per gallon.

You are shaking your head?

Dr. WHITMAN. I am sorry, Senator. May I make one general comment here? We will of course have some specific responses to some of the issues you raised in our written responses.

But there is one general point and in a way I think we should all be grateful to Messrs. Plotkin and Duleep in pointing out the long-time horizons required. And they talked about and you add 8 years to 5 and you get 13. But there is another side to that and that is the further you go out into future, the more uncertainty there is and the more there is you do not know. And therefore, the more apprehensive you have to be about setting absolute requirements for an uncertain environment.

Back in 1981, Mr. Duleep did the first of his studies. And he forecasted then that the CAFE met in 1990 would be, depending on which kind you used, between 36 and 40 miles per gallon, that that is what it would reach.

Our own forecasts were not quite that high, but they were not a whole lot better. We expected a very different fuel price environment, a very different consumer environment. And the fact is that it turned out very, very differently. And the costs of that difference to the industry were considerable.

And so, again, the further out in the future you try to go, the more uncertainty there is associated with what the environment will be like.

The CHAIRMAN. Are you saying you like the 1996 and 2001 dates?

Dr. WHITMAN. No. I do not say that at all, because I think they are absolutely right in their statements about what is and is not—the fact that very little is possible, if anything, by 1996 and there are very substantial restrictions on what can be achieved in 2001 if you take into account the financial constraints and so forth, you get even more restricted.

The CHAIRMAN. What I am asking is, as the other witnesses testify, you might give us your judgment on that. Would it help to go from 1996 to 1998, 2001 to 2005, and up the target a little bit from what we otherwise might do? If you would like to think about that, do. But those are the kinds of things that we are going to be interested in getting answers to on the committee.

Mr. Boltz.

STATEMENT OF RONALD R. BOLTZ, VICE PRESIDENT, PRODUCT STRATEGY AND REGULATORY AFFAIRS, CHRYSLER CORP.

Mr. BOLTZ. Thank you, Senator.

Chrysler appreciates the opportunity to extend our remarks before this committee. And today I would like to provide some additional comments about CAFE for your consideration.

It is important to understand the difference between CAFE and fuel efficiency. We have used those terms, I have heard them today several times, as if they are synonymous. They are not. CAFE is declining throughout the industry, as you know. What you may not know is that fuel efficiency continues to increase.

As Senator Burns mentioned earlier, moving a mass a distance requires energy. The weight of a vehicles times the distance it travels on a gallon of fuel is a convenient efficiency measure. In fact, EPA has tracked passenger car fuel efficiency in ton miles per gallon for several years.

I have a chart with me today. It is appended to the testimony as chart number 1. And we also have it on the easel if that is easier for you to see. It displays the results for CAFE as one of the lines and ton miles per gallon fuel efficiency as the dotted line for the 1975 through 1990 model year period.

All the CAFE has declined recently, in 1989 and 1990 fuel efficiency continues to increase. So CAFE and fuel efficiency are not the same. CAFE improvement depends on the mix of vehicles sold and fuel efficiency improvement really does not.

With regard to the future, Chrysler will replace its entire passenger car lineup during the next 4 years. We will introduce four new engines and two new transmissions. We will improve aerodynamics and rolling resistance. We will reduce weight per cubic foot of size. We will meet new exhaust, emission, and safety standards. And we will increase the fuel efficiency of our products by applying every technology available to us.

And we will spend more than $16 billion during 1991 to 1995 doing this. We expect size mix to shift modestly towards larger cars in the future. But these cars will be more fuel efficient even if they are a bit larger on average than today because that it what our customers want.

We expect our CAFE to improve as a result of these actions. The extent of the improvement, however, will depend on gasoline prices. The effect these prices have on vehicle mix and customer perceptions of the cost effectiveness of the technologies employed, you heard this morning that in the max technology case, the price of vehicles could increase easily $800.

I have a chart that illustrates the effect of gasoline prices and secular trends on small car mix. It is chart number 2 attached to the statement. As you can see, the small car mix is somewhat dependent on the prevailing price of gasoline.

Also, in recent years from 1981 forward, the mix of small cars has been declining. With regard to cost effectiveness, we would like to suggest that customers measure the cost effectiveness of fuel efficient technologies during the ownership period. And I think you heard some testimony to that effect this morning. This is typically 6 years or 7 years. Customers expect to offset the cost of fuel efficient technologies with fuel savings.

The price of fuel, therefore, is a key element is this calculation. So we brought along a chart, chart number 3 attached to the statement that shows actual and projected gasoline prices for the 1970 period and, of course, our projections through the year 2000.

Now some analysts calculate the cost effectiveness of fuel efficiency improvements as assuming a vehicle useful life of 13 years to 15 years. We believe that is contrary to the perspective of our customers, new car buyers. Some analysts use high projected fuel prices. And some do not consider capital costs to bring these new technologies to market. The value of any cost effectiveness study based on such assumptions is questionable, at least in our minds.

I would like to say that no analyst understands the economic practicability of achieving higher CAFE for any particular manufacturer or group of manufacturers at this moment. That is why the NAS study that you heard about on February 28th is so important. And that is why a directed rulemaking in our view makes a great deal of sense if it is based on a comprehensive study of that type.

Gentlemen, gasoline is cheap. CAFE improvements are difficult to achieve when gasoline is cheap.

Chart number 4 shows the price of gasoline at constant economics for the 1970 through 1990 period and the price of gasoline per mile traveled based on new car fleet average fuel economy. The real price of gasoline is low. And the price per mile is trending downward. It is easy to see why the American public increasingly favors a bit more room or a bit more performance when purchasing a new car.

And there is good correlation between real gasoline prices and the number of miles each vehicle travels. This gets to fuel consumption, gentlemen, as we show on chart number 5. When real gasoline prices increase, vehicle miles traveled decline and vice versa.

Reductions in real gasoline prices, combined with fuel economy improvements encourage consumption, not conservation. Therefore, higher CAFE in an era of cheap gasoline is a self-defeating policy. And that is why we believe energy policy should address fuel prices through gasoline taxes, carbon fees or other means.

We believe a gasoline tax or carbon fee policy should accompany any revisions to CAFE standards, harness both regulation and market forces to pull the wagon of national interest and put both horses at the same end of the wagon, not at opposite ends pulling against one another, which is the case today.

I would like to close with a few comments about volume average fuel economy and other approaches that use EPA size, class, or interior volume data.

As shown on chart number 6 attached to the testimony and on the board, measured fuel economy does not correlate with interior volume. It simply is not related. Averaging the data, perhaps enhances the analytical appeal of the VAFE approach, but it simply does not work at the micro level.

Any system that assumes the Rolls Royce Corniche and the Geo Metro are the same size is inherently frail. The VAFE approach does this. The interior volume method is barely adequate as a consumer information aid and is totally inadequate as the basis for regulation.

VAFE is also subject to gamesmanship. I think you heard that comment this morning. Furthermore, if we cannot envision how the VAFE approach will apply to light trucks, for example there is no analog for the volume of a pickup truck, so VAFE does not work for light trucks and some other method must be used.

And finally, the VAFE approach may not result in improvements to new vehicle fleet average fuel economy if manufacturers abandon production of small cars and focus on large cars. New fleet average fuel economy will decline rather than increase. VAFE will not achieve the goals of S. 341.

And if these goals are unimportant, then why change anything?

We continue to favor the percentage increase approach contemplated in title XI as we indicated on February 28 and urge the committee to reject the VAFE or size class approach.

Thank you very much.

[The prepared statement of Mr. Boltz follows:]

Statement of Ronald R. Boltz
Vice President, Product Strategy and Regulatory Affairs
Chrysler Corporation

Before the Senate Energy and Natural Resources Committee
March 20, 1991

Thank you Mr. Chairman, and good morning. I am Ronald R. Boltz, Vice President of Product Strategy and Regulatory Affairs for Chrysler Corporation. We appreciate the opportunity to extend our February 28th remarks before this Committee. Today, I would like to provide additional comments about CAFE for your consideration.

CAFE Is Different From Fuel Efficiency

We must understand the difference between CAFE and fuel efficiency. CAFE is declining throughout the industry. Fuel efficiency, however, continues to increase.

Moving a mass a distance requires energy. The weight of a vehicle times the distance it travels on a gallon of fuel is a convenient efficiency measure. EPA tracks passenger car fuel efficiency in ton miles per gallon.

Chart #1 displays the results for CAFE and ton-mpg fuel efficiency from 1975 to 1990. Although CAFE declined in 1989-1990, fuel efficiency continued to improve.

So, CAFE and fuel efficiency are not the same. CAFE improvement depends on the mix of vehicles sold. Fuel efficiency improvement does not.

New Vehicles Will Provide Better Fuel Efficiency

Chrysler will replace its entire passenger car line-up during the next four years. We will introduce four new engines and two new transmissions. We will improve aerodynamics and rolling resistance. We will reduce weight per cubic foot of size. We will meet new exhaust emission and safety standards. We will increase fuel efficiency by applying every technology available to us. And we will spend more than $16 billion during 1991-95.

We expect size mix to shift modestly toward larger vehicles, due primarily to population demographic changes that will take place during the 1990's. Cars will be more fuel efficient, but larger on average than today. That's what our customers want.

We expect CAFE to improve somewhat as a result of these actions. The extent of the improvement, however, will depend on gasoline prices. The effect these prices have on vehicle mix. And customer perceptions of the cost effectiveness of the technologies employed.

Size Preference and Cost Effectiveness Depend On Gasoline Prices

New car buyers choose the size of a vehicle based on their needs and pocketbooks--including the price of fuel. Chart #2 illustrates the effect of gasoline prices and secular trends on small car mix.

Our customers measure the cost effectiveness of fuel efficient technologies during the ownership period. This is typically six or seven years. They expect to offset the cost of fuel efficient technologies with fuel savings. The price of fuel is a key element in this calculation.

Chrysler based its plans on gasoline price forecasts of $1.17 per gallon for 1995, and $1.24 per gallon for 2000 (constant 1989 economics). The weighted average retail price of gasoline was about $1.15 per gallon in 1990. Chart #3 shows actual and projected gasoline prices for 1970-2000.

Some analysts calculate cost effectiveness using a vehicle useful life of 13-15 years (contrary to the perspective of new car buyers). They use high projected fuel prices. And do not consider capital costs to bring these technologies to market. The value of any study based on such assumptions is questionable.

And no analyst understands the economic practicability of achieving higher CAFE for a particular manufacturer or group of manufacturers. That is why the NAS study is so important.

Gasoline Is Cheap

CAFE improvements are difficult to achieve when gasoline is cheap. In fact, gasoline prices, adjusted for inflation and fuel economy improvements, are lower today than at any time during the last two decades. Chart #4 shows the price of gasoline at constant economics for 1970-1990. And the price of gasoline per mile travelled (based on new car fleet average fuel economy).

The real price of gasoline is low. And the price per mile is falling. It is easy to see why the American public increasingly favors a bit more room and performance when purchasing a new car.

Gasoline Prices Also Affect Vehicle Miles Travelled

Low gasoline prices combined with fuel economy improvements make travel by car more affordable than ever. There is good correlation between real gasoline prices and the number of miles each vehicle travels, as shown on Chart #5.

When real gasoline prices increase, VMT declines. And when prices decline, VMT increases. Reductions in real gasoline prices combined with fuel economy improvements encourage consumption, not conservation.

Therefore, higher CAFE in an era of cheap gasoline is a self-defeating policy. And that is why we believe energy policy should address fuel prices --through gasoline taxes, carbon fees or other means.

Energy Policy Should Employ Market Forces

There is a strong relationship between fuel prices, VMT and vehicle mix. Therefore, we believe a gasoline tax or carbon fee policy should accompany any revisions to CAFE standards.

Harness both regulation and market forces to pull the wagon of National interest. And put both horses at the same end of the wagon-- not at opposite ends, pulling against one another. Which is the case, today.

VAFE/Size Class Approach Is Inadequate

I would like to close with a few comments about VAFE, and other approaches that use EPA size class or interior volume data.

As shown on Chart #6, measured fuel economy does not correlate with interior volume. Cars with the same interior volume get vastly different fuel economy. Averaging the data enhances the analytical appeal of the VAFE approach--but it simply does not work at the micro level.

Any system that assumes the Rolls Royce Corniche and GEO Metro are the same size is inherently frail. The VAFE approach does this. The interior volume method is barely adequate as a consumer information aid. And it is inadequate as the basis for regulation.

VAFE also is subject to gamesmanship. An interior volume increase of 10 cubic feet or more is achievable by increasing headroom six inches. The actual utility of the vehicle will not improve.

Furthermore, we can not envision how the VAFE approach will apply to light trucks. For example, there is no analog for the volume of a pick-up truck. So, VAFE does not work for light trucks.

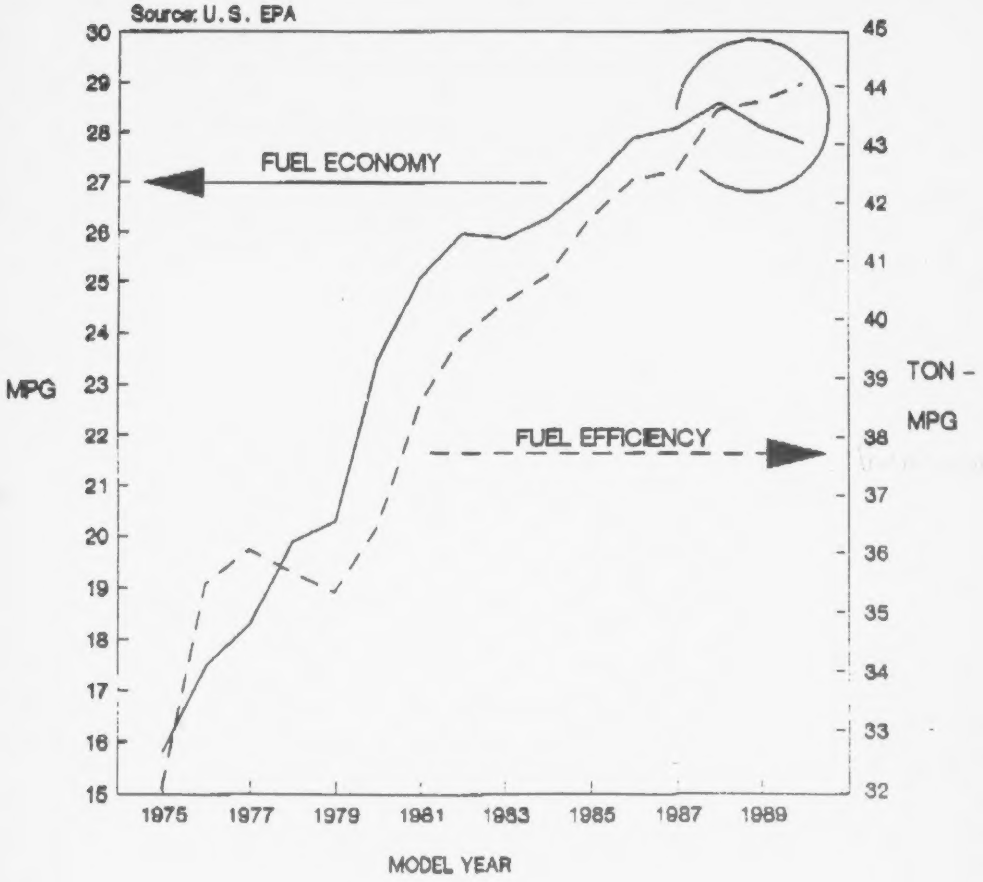
Finally, the VAFE approach may not result in improvements to new vehicle fleet average fuel economy. If manufacturers abandon production of small cars and focus on large cars, new car fleet average fuel economy will decline rather than increase. VAFE will not achieve the goals of S.341. And if these goals are unimportant, then why change anything?

We continue to favor the percentage increase CAFE approach contemplated in Title XI. We urge the Committee to reject the VAFE/size class approach.

Thank you for your attention.

Chart #1

NEW CAR FLEET AVERAGE FUEL ECONOMY
AND
NEW CAR FLEET AVERAGE FUEL EFFICIENCY



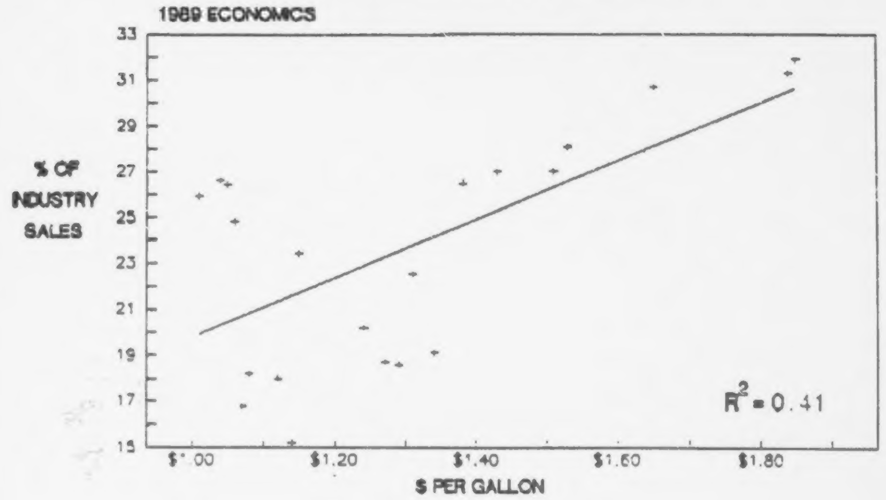
Source: U.S. EPA

Certification & Regulatory Programs
ecoeff-tbg 3/18/91

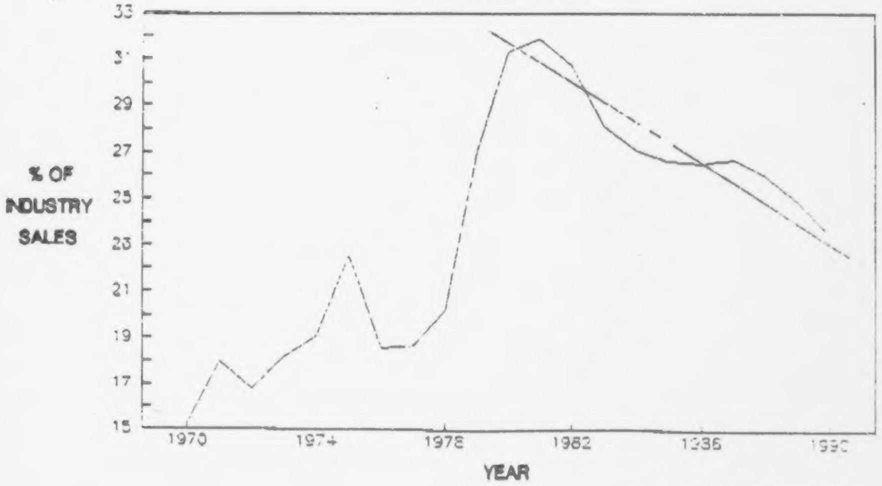
Chart #2

SMALL CAR SALES

VERSUS GASOLINE PRICE



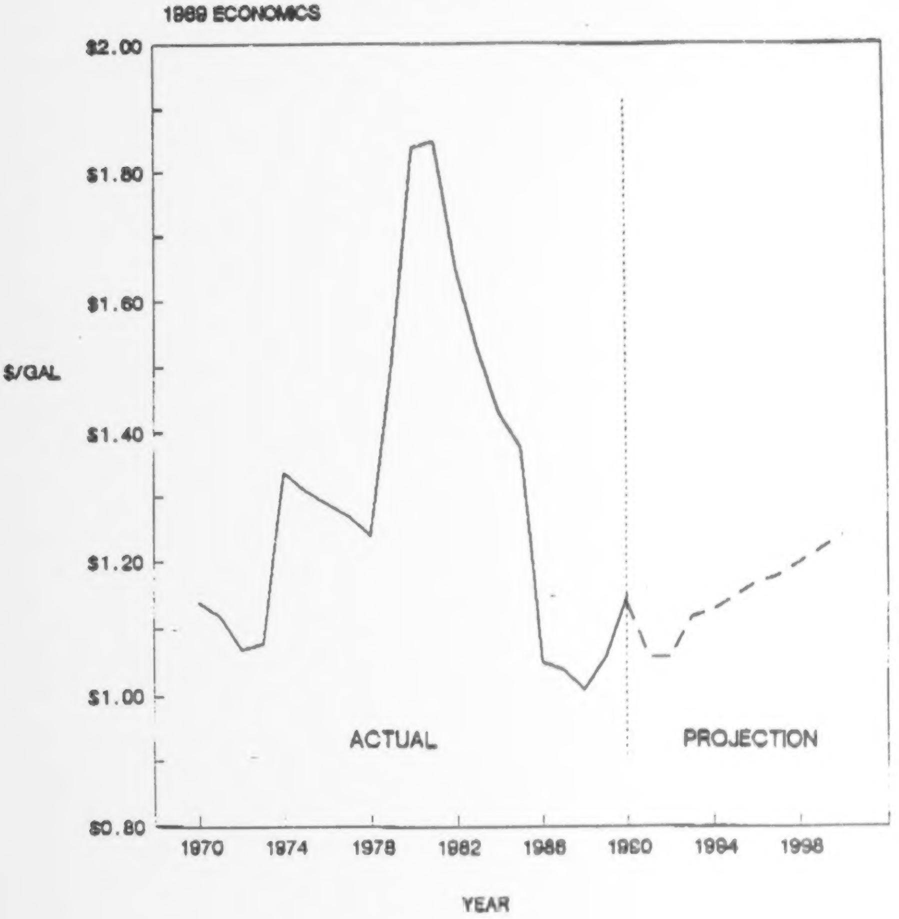
VERSUS TIME



Certification & Regulatory Programs
smallmix-tbq 3/18/91

Chart #3

REAL GASOLINE PRICE
1970 -- 2000



Certification & Regulatory Programs
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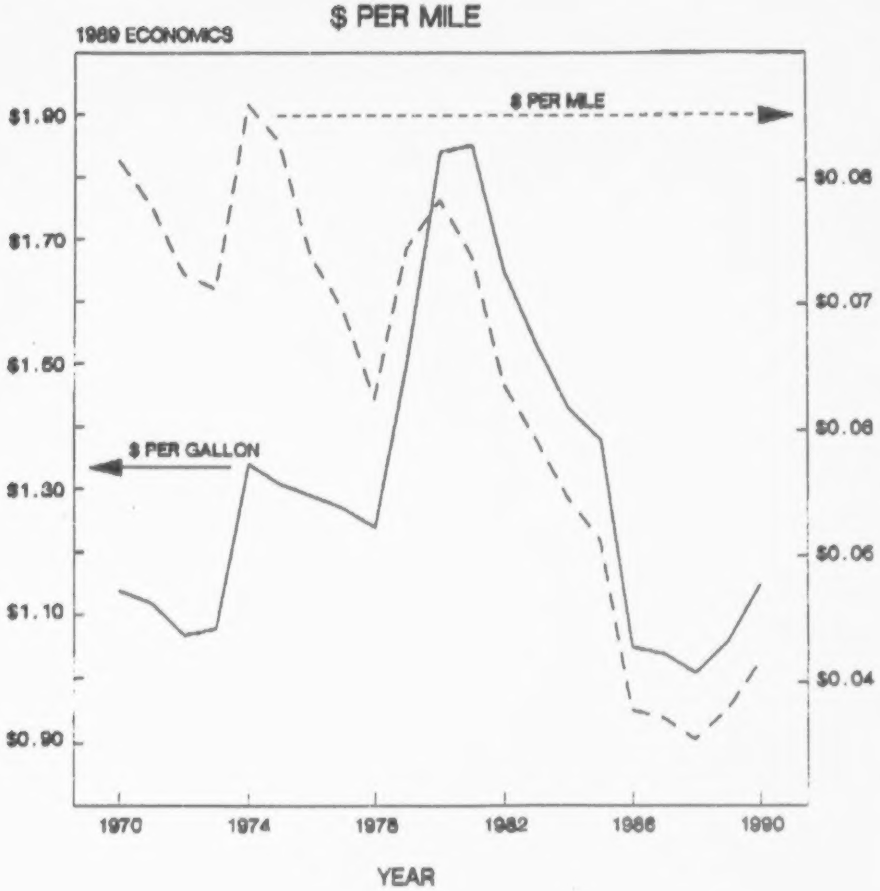
Chart #4

REAL GASOLINE PRICE
$PER GALLON
AND
$ PER MILE



Certification & Regulatory Programs
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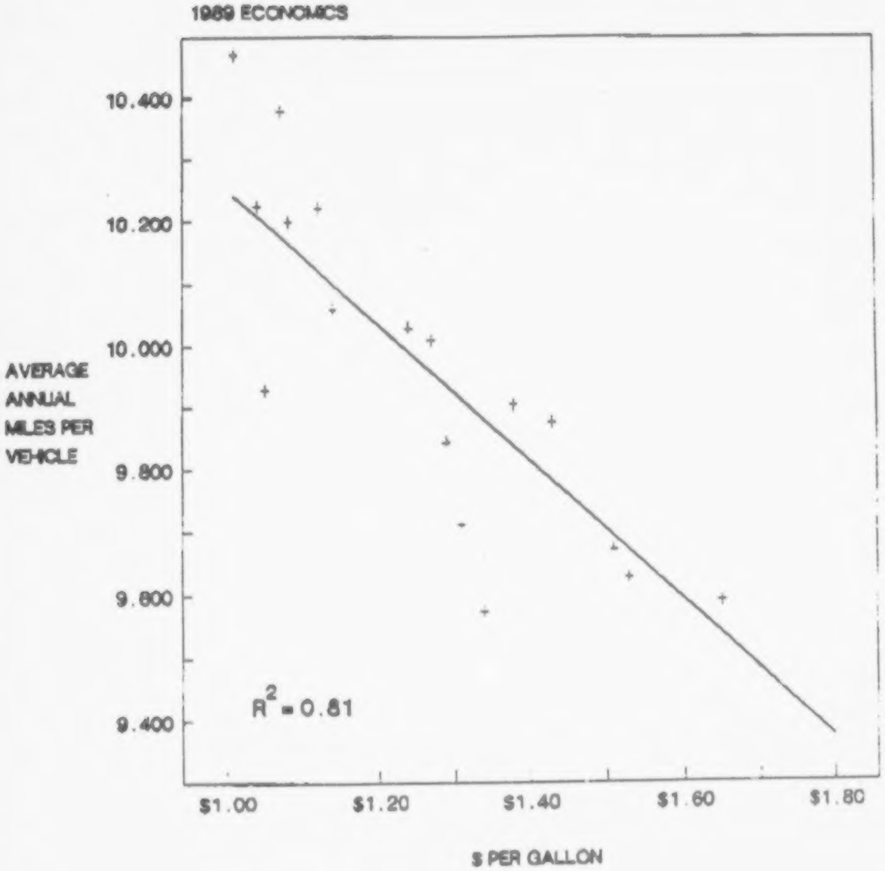
Chart #5

MILES PER VEHICLE
VS
PRICE OF GASOLINE



Certification & Regulatory Programs
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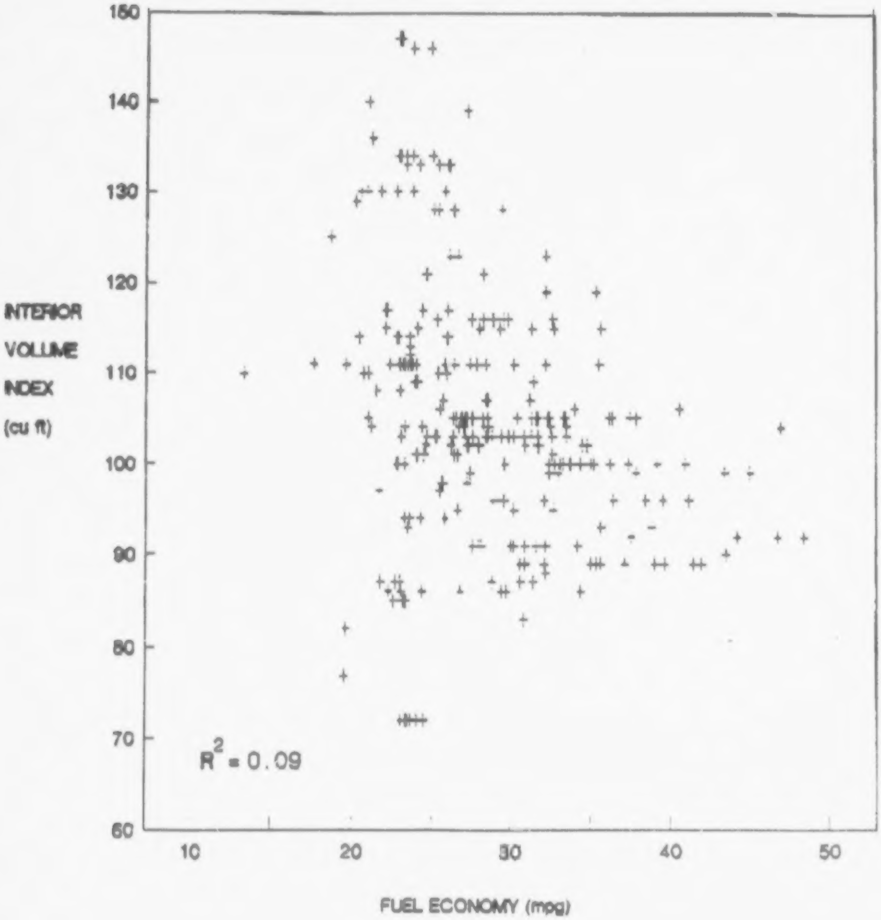
Chart #6

INTERIOR VOLUME VS MPG

EPA DATA FOR 1990 PASS CARS



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Senator WALLOP [presiding]. Thank you very much, Mr. Boltz.
Mr. Pestillo.

STATEMENT OF PETER J. PESTILLO, VICE PRESIDENT, CORPORATE RELATIONS AND DIVERSIFIED BUSINESSES, FORD MOTOR CO.

Mr. PESTILLO. Thank you. We appreciate this opportunity to comment further on CAFE legislation because the outcome is critically important to our customers and certainly to the health of our industry.

There are three fundamental elements that determine a manufacturer's CAFE, the size and weight of the vehicles in the fleet, the technology utilized, and the relative quantities or the mix of vehicles purchased by its customers. I would like to comment briefly on each.

First, size and weight. All good things being equal, the fuel economy of a vehicle is directly related to its weight. It is technically possible to further reduce weight by extensive use of light-weight aerospace materials, but not at prices our customers are willing to pay. And if you reduce weight by downsizing there are adverse safety consequences because there is less structure to help absorb the energy.

Second, technology. There are several factors that are important in evaluating how far technology can take you. First, there is no known technology, experimental, on the shelf, or otherwise that can provide a quantum leap from where we are today or that can nullify the relationship of fuel economy to size and weight. Also, as in any task the first actions taken are the ones that provide the greatest benefits at the least cost.

Some of the fuel economy improvement technologies we have applied are not cost beneficial for customers. For example, four-valve engine technology adds about $400 to the price of a vehicle, while improving fuel efficiency only by 3 percent. Now at today's gas prices it would take almost 20 years of fuel savings for the customer to recoup the initial cost.

Another important fact in determining how much benefit can be derived from technology in a given time period is lead time. This has the greatest impact on full line manufacturers. Now, Ford has got 24 car and truck lines and uses 51 power train combinations. So it is physically impossible for us to redesign them all simultaneously. There just are not enough engineers and test facilities or certainly, investment dollars.

However, it is a high stakes business we are in where products cannot be rushed to market. We have learned the hard way the consequences of not getting things right. You not only risk market share and profits, but also your ability to meet CAFE standards, which are tied to meeting volume and technical requirements as well.

Mix is the third key variable that determines a manufacturer's CAFE. To comply with CAFE requirements, Ford has distorted traditional pricing relationships to encourage the purchase of smaller cars. We have run virtually continuous incentive programs on small cars and trucks. We have found that our ability to affect the mix of vehicles that customers buy is very limited, particularly with today's gasoline prices.

Potential fuel economy improvement also is affected by other regulatory requirements which are expected to reduce CAFE by at least a mile per gallon. I speak of safety, CFC's and the Clean Air.

Looking at these various factors, Ford's assessment is that S. 279 goes too far and would force vehicle downsizing and restrictions in the availability of products for customers. With this in perspective, our 1996 CAFE test under the Bryan bill would be about 32 miles per gallon, about today's levels for Isuzu and Hyundai who sell only small cars.

In effect, we would be forced to turn Ford into an Isuzu or Hyundai in 4 short years.

Even the authors of the original study in which S. 279 is based now have said that that is just not possible by 1996.

The committee has asked our views on setting fuel economy objectives by market segments. First, it must be recognized that we have been living for 15 years in a CAFE system that has penalized U.S. producers. The standard that was set in 1975 required Ford to improve its fuel economy by about 98 percent. It, as well, imposed little or no CAFE tests on the Japanese manufacturers.

The market segment approach is simply tailor-made to suit manufacturers that are expanding into larger car and truck markets, while at the same time forcing across the board investments by those already in the every class. The net effect is further market distortion. Also, because there is no iron-clad way to categorize vehicles, this approach is certain to encourage gainsmanship.

It is critical that any consideration of auto efficiency requirements, one, give all manufacturers the same relative task, not simply continue the present system that disadvantages full line manufacturers. Two, that it provide adequate lead time for cost-effective implementation of new technologies. Three, that it minimizes market distortions and that impact on consumer choice. And, four, that it be based on a comprehensive study of economic and technical factors.

We need a reasoned outcome based on sound technical judgments, not merely a mandated one that is a result of political compromise between two extremes. We believe that the approach taken in S. 341, that is directed rule making based upon percentage improvement addresses many of these factors and most importantly, would allow full consideration of the technical and economic study under way by the National Academy of Sciences.

We strongly urge the committee not endorse specific fuel economy standards in this study until the study can be completed.

Thank you, Senator.

[The prepared statement of Mr. Pestillo follows:]

Testimony of
Peter J. Pestillo
Vice President, Corporate Relations and Diversified Businesses
Ford Motor Company
Before the Senate Energy and Natural Resources Committee
March 20, 1991

Mr. Chairman, thank you for the opportunity to offer further testimony on proposed CAFE legislation, the outcome of which is critically important to consumers and to the health of our industry. Motor vehicles do account for a substantial portion of petroleum usage, and we agree that auto fuel efficiency is an appropriate element of a comprehensive national energy strategy. Ford is committed to further fuel efficiency improvements in its cars and trucks -- we would do so in order to remain competitive with or without further regulation.

There are three fundamental elements that determine a manufacturer's corporate average fuel economy: the size and weight of vehicles in its fleet; the level of technology utilized; and the relative quantities -- or mix -- of small, mid-size and large vehicles purchased by its customers. I'd like to comment briefly on each of these elements.

First, size and weight. All other things being equal, the fuel economy of a vehicle is directly related to vehicle weight. In the last decade, we have reduced vehicle weight by about 1,000 pounds by optimizing exterior size to the interior volume but these kinds of opportunities have been exhausted. Looking to the future, there are two basic ways to reduce vehicle weight -- by substituting lighter weight materials or by downsizing. It's technically possible to further reduce weight by extensive use of light-weight aerospace materials, but not at prices our customers are willing to pay. If you reduce weight by downsizing, there are adverse safety consequences because there is less structure to help absorb the energy.

Second, technology. There are several factors that are important in evaluating how far technology can take you. First, there is no known technology -- experimental, on the shelf or otherwise -- that can provide a quantum leap from where we are today or that can nullify the relationship of fuel economy to size and weight.

Also, as in any task, the first actions taken are the ones that provide the greatest benefit at the least cost. Some of the fuel economy improvement technologies we've applied are not cost-beneficial for customers. For example, four-valve engine technology adds from $200-$400 to the price of a vehicle, while improving the fuel efficiency by about 3 percent. At today's gasoline prices, it would 10-20 years of fuel savings for the customer to recoup the initial investment.

European and Japanese fleets are sometimes cited as more technologically advanced than those in the United States. In fact, the U.S. fleet is the most fuel-efficient in the world on a product-for-product basis. While the new car average fuel economy in these areas is in the mid-30 mpg range, the difference between the U.S. and these fleets are fully accounted for not by technology, but the kinds of products consumers choose. For example, in Europe, small cars account for about 65 percent of the fleet -- three times the U.S. level. Engine displacement is about 30 percent smaller. Ninety percent of European cars are equipped with manual transmissions compared with 10 percent in the U.S. Fourteen percent have diesel engines, versus less than 1 percent in the U.S. Ten percent have air conditioning compared with more than 70 percent in the U.S. Also, European cars are relatively lighter because they lack many safety features required in the United States.

Why is the European "taste" in cars so different? Gasoline is $3.00 to $4.00 a gallon, there are significant taxes to discourage the purchase of bigger cars and large engines. Roads are narrow and travel is not as extensive. Also, parking is limited and more suitable to smaller vehicles. Surely, given these strong incentives, if any breakthrough fuel economy technology existed, a manufacturer would gain a real competitive advantage in employing it.

Another important factor in determining how much benefit can be derived from technology in a given time period is manufacturer lead time, which has the greatest impact on full-line manufacturers. Ford has 24 car and truck lines; they use 51 powertrain combinations. It's physically impossible to redesign them all simultaneously despite the fact that we plan to spend even more in the next five years than the record $26 billion we spent in the last five. There simply are not enough engineers, test facilities or investment dollars.

Moreover, it is a high stakes business where products cannot be rushed to market. The Ford Taurus and Mercury Sable, which are often cited as breakthrough products, required about five years from concept to customer -- including consumer research, crash testing, durability testing, emissions certification, hot and cold weather testing and retesting at each spot the product fell below expectations. We're working to shorten this timing, but we've learned the hard way the consequences of not getting it right. You not only risk market share and profits, but also your ability to meet CAFE standards, which are tied to meeting volume and technical targets.

Mix is the third key variable that determines a manufacturer's CAFE. We have learned that there is not much we can do to move consumers away from the products they've decided meet their wants and needs. To comply with CAFE requirements, Ford has distorted traditional pricing relationships to encourage the purchase of smaller cars -- the price of an Escort was about 70 percent that of our full size car when we introduced it ten years ago. Now it is about 50 percent. And we've run virtually continuous incentive programs on small cars and trucks. But we've found that our ability to affect the mix of vehicles customers buy is very limited, particularly with present gasoline prices.

Potential fuel economy improvement also is affected by other regulatory requirements, which are expected to reduce CAFE by at least one mile per gallon.

Looking at these various factors, Ford's assessment is that S.279 goes too far. By requiring too much too soon, this bill would force manufacturers into vehicle downsizing and restricting the range of product offerings. To put this into perspective, Ford's 1996 car CAFE task under S.279 would be about 32 mpg. That's about today's CAFE level for Isuzu and Hyundai -- which sell only small cars -- and 2-4 mpg higher than the CAFE of the major Japanese manufacturers participating in this market. In effect, we would be forced to turn ourselves into an Isuzu or Hyundai in four short years. Even the authors of the original study on which S.279 is based have now said that this much is not possible by 1996.

The Committee asked for our views on setting fuel economy objectives by market segments. First, it must be recognized that we have been living for 15 years with a CAFE system that has had the unfortunate effect of being unfair to U.S. producers. The standards set in 1975 required Ford to improve the fuel economy of its fleet by 98 percent. But the standards imposed no CAFE task on Honda, a 10 percent task for Nissan, and a 25 percent task for Toyota. The unequal tasks were not due to differences in technology, but because these manufacturers had fleets that were primarily small cars. Moreover, while domestic CAFE performance has shown overall progress, the performance of the imports has declined 3-5 mpg from their peak.

A market segment approach is tailor-made to suit manufacturers that are expanding into larger car and truck markets, while at the same time forcing across the board investments by those already in every class. The net effect is further market distortion. Also, because there is no "iron clad" way to categorize vehicles, this approach is certain to encourage gamesmanship.

It is critical that any consideration of auto efficiency requirements: 1) give all manufacturers the same relative task -- not simply continuing the present system that disadvantages full line manufacturers; 2) provide adequate lead time for cost-effective implementation of new technologies; 3) minimize market distortions and impact on consumer choice; and 4) be based on a comprehensive study of economic and technical factors -- we need a reasoned outcome based on sound technical judgments, not merely a mandated one that is the result of political compromise between two extremes.

We believe that the approach taken in S.341 -- directed rulemaking based on a percentage improvement -- addresses many of these factors and importantly, would allow full consideration of the technical and economic study underway by the National Academy of Sciences. We strongly urge that the Committee not endorse specific fuel economy standards until this study can be completed.

Senator WALLOP. Thank you, Mr. Pestillo.

Mr. Olson, I am going to have to ask that you bear with us. There is a vote on, Senator Johnston has gone to vote and will return. I will have to leave now to do that. So the other three witnesses, we will just await the return of the chairman.

I would like to put something in the back of your mind, that I doubt that anybody has the technical expertise to answer here, but it strikes me that if we are going to aluminum locks, as Mr. Duleep suggested, maybe one of the things that there is an enormous amount of energy that goes into the production of that aluminum.

If we are going to new plastics for certain body parts, there is an enormous amount of petroleum base that goes into the manufacture of those plastics. I am not certain if anybody knows what the tradeoff is within that, but they do the committee would be more than interested in hearing it.

I am going to ask that the committee stand in recess until the return of the chairman.

Thank you.

[Recess.]

The CHAIRMAN [presiding]. Sorry for the interruption, but we had to vote.

STATEMENT OF JAMES OLSON, VICE PRESIDENT, EXTERNAL AFFAIRS, TOYOTA MOTOR SALES, USA

Mr. OLSON. Thank you, Mr. Chairman, for providing Toyota the opportunity to testify on S. 341. At the outset let me applaud you and Senator Wallop for introducing S. 341. Your bill seriously addresses the many competing elements manufacturers must take into account when trying to improve fuel economy, safety, emissions, performance, and size.

By seeking a thorough examination of the industry's capability to deal with these competing consumer needs, S. 341 is a good starting point for developing a meaningful and workable CAFE provision.

Toyota is not against improving motor vehicle fuel efficiency. Historically, we have been the fuel economy leader among multiline companies. Our leadership in the area of fuel economy is due in large measure to our aggressive use of fuel-economy technology. In fact there is a chart attached to our written submission that show just that.

Just this year we introduced a totally new version of our most fuel-efficient car, the Tercel, which gets 6 percent better city fuel economy than the model it replaces. As I told Senator Bryan, the Tercel also demonstrates the impossibility of meeting the unrealistic CAFE targets proposed in S. 279 without significant downsizing or technological breakthroughs we do not foresee.

The CAFE of 35.3 miles per gallon for the most fuel-efficient car in our fleet, the Tercel, is more than 4 miles per gallon less than the 39.6 miles per gallon standard our entire fleet would have to average by 1996 under Senator Bryan's bill.

Furthermore, Mr. Chairman, as Mr. Plotkin noted, model year 1996 is already here in terms of the company's fuel efficiency. The design and engineering for models which will be introduced and on the road by 1996 is virtually complete. Absent a significant change in consumer preference, a company's CAFE level for 1996 is not likely to increase much above its current product line.

As I said earlier, Mr. Chairman, your bill is a good starting point, however, the uniform percentage increase method is signed to DOT in S. 341 for setting CAFE standards is the same as that in 279 and is in our view fundamentally flawed. Mandating different standards for different companies by requiring each to increase by the same percentage creates a number of perverse effects, not the least of which is the failure to achieve anticipated fuel savings.

First, the perversity of the percentage approach is best demonstrated when analyzing the credit program. Assuming hypothetically a mandated 20 percent increase, a company achieving a 28 mile per gallon level in 1996 could be rewarded with credits while Toyota could be penalized for achieving 36 miles per gallon, .6 of a mile short of its standard. The logic of this approach escapes us.

Second, never again will any company have an incentive to exceed regulatory requirements for CAFE, safety, emissions, or any other regulations, because the lesson of uniform percentage increase is that your good performance will be held against you.

A third reason, and one so far unaddressed, is that the desired fuel economy gains will not be realized. We firmly believe this unintended result will occur for two reasons. First, the market will shift to less fuel-efficient vehicles, and two, the approach creates substantial opportunity to game the system. The anti-competitive effects of this approach would assure that fuel-efficient leaders like Toyota would be legislated out of certain markets where we currently offer a higher mileage choice for American consumers. Many of the most fuel-efficient vehicles would be replaced with less fuel-efficient vehicles. This effect will frustrate the fuel savings goals of CAFE.

We have less technological head room. In essence our cars already incorporate most of the technologies, everything except five-speed automatics and individual valve control of Mr. Duleep's hypothetical 2001 Taurus. Uniform percentage increase would force us to adopt a course of action beyond max tech.

Now, let me turn to how the uniform percentage increase systems leads to gaming, that Mr. Duleep referred to. First, a drink of water—excuse me.

First, companies entering the U.S. market after the base year, enter free of CAFE restraints. They can compete in any market segments, securing market's share from existing manufacturers with higher CAFE targets. In prior testimony, Mr. Duleep said new entrants can be expected from Taiwan and Malaysia. New entrants with lower fuel economy requirements, even if minimum standards were added, would frustrate the percentage increase goals of S. 341.

This new-entrant gaming could be particularly egregious in the light-truck market. Manufacturers not currently selling trucks, for example, Honda, Mercedes-Benz, and Volvo, could be again selling pickups, vans, or sport utility vehicles in the U.S. relatively free of CAFE constraints. And let me note that the Mercedes, according to the spy photos I have seen, has vans under development.

The CHAIRMAN. Is there any way to fix that, by the way? That particular gaming problem of either brand new entrants or old companies with a new model or new truck or whatever?

Mr. OLSON. We do not see any—not under the UPI system.

As the performance and utility of trucks sold by existing makers declined in response to new CAFE demands, new entrants would gain market share by providing the type of vehicles consumer demand, once again undercutting anticipated fuel economy gains. Let me read another margin note here. For example, the CAFE performance of our current two-wheel drive truck fleet is nearly at the 1996 Bryan bill target in Mr. Plotkin's.

I would now call your attention to the attached chart which is attached to my oral testimony. Depicting their interrelationships of many of the world's major auto makers, as globalization of our industry has matured, these interrelationships have materialized and accelerated for a variety of very sensible competitive reasons, technology transfer, equity needs, and market expansion are just a few of them. The uniform percentage approach is likely to provide an unexpected new reason for entering into these arrangements to minimize CAFE requirements.

There is one example of how this could work. A company with a low-mileage fleet enters into an arrangement to sell under its name plate a high-mileage vehicle produced by another manufacturer, even a model already being sold in the United States. By that simple change in the name plate, re-badging if you will, the low-mileage company's CAFE increases even though precisely the same cars are sold in the U.S. The result arrives in CAFE performance but absolutely zero fuel savings.

Let us take another example. A joint venture which is common in the auto industry is entered into by a high-mileage and low-mileage company to produce a small fuel-efficient car. 100,000 cars are to be produced. 50,000 are going to company A, and 50,000 to company B. Then uniform percentage increase CAFE is enacted. By shifting allocation to a 60/40 arrangement, the same 100,000 cars are sold, but the fuel economy of at least one of the companies increases, but there is no net fuel savings.

Mr. Chairman, these problems cannot be fixed because they are inherent to a uniform percentage increase system which mandates significantly different standards for different companies. This system creates an incentive for arrangements among companies for no other purpose then reducing the impact of CAFE requirements. Let me note that any system can be gamed, but the UPI approach presents a huge window of opportunity for that kind of approach.

S. 341 has many meritorious provisions. We want to work with you and the committee to develop a workable CAFE program that does not give any company an advantage, that advances fuel economy technology across all classes of vehicles, that increases the fuel efficiency of the new car and truck fleet, and that retains the product choice and utility customers want and need from their vehicles.

Thank you for this opportunity to present our views. I would be happy to answer any questions you have.

[The prepared statement of Mr. Olson follows:]

WRITTEN STATEMENT OF TOYOTA

for the Senate Energy Committee

on S.341

"The National Energy Security Act of 1991"

March 20, 1991

I. INTRODUCTION

Toyota appreciates the opportunity to submit its views on S.341, the "National Energy Security Act of 1991."

Toyota takes pride in the fact that historically we have been the fuel economy leader among multi-line companies. Since the CAFE law was passed in 1975, Toyota has consistently exceeded the standards set forth in the law in large measure because of our continuing commitment to aggressively employ fuel economy technology. We are not against improved fuel efficiency, and we applaud the sponsors of S.341 for introducing a bill which provides a good starting point for developing a meaningful and workable CAFE provision.

Unlike some other bills that have been introduced to amend CAFE, the provisions of S.341 propose some positive changes to the current program. Eliminating the time frame by which a manufacturer has to use or lose accumulated credits is a good provision, as is the provision allowing credits for the installation of air bags in small cars. CAFE is a command and control program void of market incentives. Assuming gas prices remain relatively stable, incentives such as those proposed in S.341 are necessary for manufacturers.

Unfortunately, while there is much in S.341 to support, a fundamental flaw remains. Directing the Secretary of Transportation to set standards based on uniform percentage increases for each manufacturer is anti-competitive and anti-consumer and would serve only to undermine the expressed energy conservation goals of the bill. It is our firm hope and desire that we can work with the Committee to amend this provision of the bill and create a non-discriminatory and workable CAFE program. Following are more specific comments on S.341 in response to the specific questions asked by the Committee.

II. CRITERIA FOR ESTABLISHING STANDARDS

The assumptions contained in §11007 of S.341 address many of the issues that should be considered when setting fuel economy standards. They are based on the most current completed model year (1990) and, therefore, unlike S.279, do not require a roll-back to a level of size and performance in earlier model years. For this we congratulate the authors of the bill.

Each of these assumptions is discussed in the following paragraphs. We must point out, however, that setting different standards for different companies based on uniform percentage increases makes it extremely difficult for these assumptions to apply equally to all manufacturers. These assumptions cannot be rigorously applied to the entire industry if companies are required to meet different standards based on past performance.

Many of the criteria included in this bill will be addressed in the upcoming National Academy of Sciences (NAS) study of fuel economy. Toyota supports the fact that this study will be conducted, and we fully intend to actively participate with NAS as the study proceeds. It should also be noted that the NAS study will analyze what fuel economy improvements can be achieved for passenger cars and light-duty trucks by size class. This method of analysis is the most appropriate means of determining the industry's capability to improve fuel economy. We believe size class is also the method that should be used for setting future CAFE standards.

Future Technology

Toyota's primary concern with the technology assumption is that the uniform percentage approach used in §11006 for setting fuel economy standards assumes all companies have employed the same level of technology in the base year. This is simply not the case. Thus, some manufacturers may be able to meet required percentage increases by using existing technology. Others, because of the high degree of technology already utilized on their vehicles, may need to significantly downsize or use highly expensive, unproven technology to meet the standards.

Table I demonstrates the high level of technology already employed by Toyota. The degree to which other companies have not employed this technology undermines the premise on which the uniform percentage increase approach is based.

The enclosed document, "Toyota Engine Technology," discusses a number of engine technologies the company has developed and is studying for future application on its vehicles. It highlights Toyota's on-going, aggressive program to further advance engine technology. Nevertheless, due to concerns over emissions, cost and consumer acceptance, substantial questions remain over the ability to commercialize certain technologies. For companies such as Toyota that have already applied high levels of technology, the task associated with significant additional improvements is much more difficult than for those companies which are not employing all available technology.

If the bill were to limit the required percentage increase to commercialized technologies, there would be very little room for improvement on Toyota's part, absent downsizing. Meanwhile, the fleet as a whole could derive substantial benefits from the wide-spread application of technologies already used by Toyota such as 4-valve per cylinder low friction engines, electrically controlled 4-speed automatic transmissions, and advanced accessories.

TABLE I

ESTIMATES FOR 1991 TOYOTA NEW CAR FLEET

Technology	Penetration Level (%)	Comments
Front Wheel Drive	87%	
Overhead Cam Engine	100%	
Multi-point Fuel Injection	100%	
Multi-valve Engines	100%	
Roller Cam Followers	0%	Not needed in OHC, DOHC direct cam to valve configurations.
Intake Valve Control	0%	Though Toyota does not use computer controlled intake valves, it does have TVIS (valves which close 4 of the 8 intake ports) on previous generation high performance engines. This has been replaced by redesigned intake tracts which improve economy without degrading performance.
Aerodynamics	99% below .37 CD	Lexus LS400 is .29.
Lock-up Torque Converter	100% of automatics	
Elec. Control Trans.	48% of automatics	Used in Lexus, Cressida, Supra, Camry, Celica and MR2.
Improved Accessories	100%	
Advanced Friction Reduction	100%	
Continuously Variable Transmission	0%	Limited to small vehicles only.
4-Speed Automatic/ 5-Speed Manual Trans.	62% 86%	
Improved Lub. & Tires	100%	100% usage of P-metric radial tires. Use anti-friction lubricants in oil. 5W-30 oil can be used in all Toyota vehicles.
Weight Reduction	--	Toyota is aggressively pursuing in all aspects of vehicle design.
Tires II	--	Extremely low benefit.
Aggressive Trans. Mgmt.	0%	Improvement claims are overly optimistic.
Idle Off	0%	Toyota used this technology in Japan in the early 1980s as a fuel savings device. Consumer complaints led to dropping its use.

Performance

Toyota believes the use of 1990 performance levels is far superior to looking backward, as is the case in S.279 which assumes 1987 levels of vehicle performance. We are concerned that this provision might be viewed as placing a cap on future performance. The Committee should make clear that use of the 1990 performance assumption does not mean that future improvements to performance cannot be made. So long as applicable standards can be met, manufacturers should be free to adjust performance as appropriate.

The formulation used in the bill to define performance is based on maximum torque. Toyota believes a more appropriate measure of performance is low-to-mid-range torque -- that is, 2000 RPM or lower.

Size

Toyota agrees with the assumptions in S.341 regarding size and interior volume. Using 1990 data takes into account current market conditions, as it should. Congress should not use dated assumptions, as is the case with S.279, which goes back fully three model years.

Interior volume for the new car fleet during the 1980s remained relatively constant, averaging 107 cubic feet. Absent significant changes in CAFE which would force downsizing, we believe this trend will continue. Consumers demand a certain variety in the size of cars and trucks offered for sale. We do not see any fundamental change in consumer behavior which would noticeably impact the size of the new car and truck fleet taken in its entirety.

Critics of a size/volume-based approach to CAFE standards assert that there is no guarantee the fuel economy of the new car fleet will improve, as companies would simply move to produce large cars and thereby avoid classes with tougher fuel economy standards. According to EPA data, in 1990 large sedans accounted for only 12.6 percent of sales. During the decade of the 1980s, large sedans averaged 11.9 percent of sales. At no time did sales of these vehicles ever exceed 14 percent in any one year.

Manufacturers produce what consumers demand. In terms of size, the overwhelming majority of consumers buy subcompacts, compacts and mid-size cars. Subcompacts and compacts accounted for just shy of 54 percent of sales last year. To simply assert that manufacturers will move up in size disregards the possibility that consumers won't buy these cars.

Emissions

The Committee has inquired about the assumption for emission standards in the time period covered by S.341. Regardless of whether DOT or Congress establishes future fuel economy standards, the assumption should be that the Tier II standards will apply in model year 2004. To base future fuel economy standards on the retention of Tier I emission standards would lead to overly optimistic estimates of potential fuel efficiency gains.

The reason for this is that as the HC, CO and NOx standards become more stringent, additional control technology or engine modifications will be required. Another concern raised by the Tier II standards is the limitation of the use of certain engine technologies. The most promising fuel-efficient powerplant (e.g., lean burn gasoline as currently used by Toyota in Europe) utilizes a lean air-to-fuel ratio. Under lean conditions NOx emissions are very difficult to control.

(Even the Tier I NOx standard may be difficult to achieve). Thus, the Tier II standards may preclude the use of some of the more promising engine technologies. Toyota is currently working on technologies to control NOx emissions under lean air-to-fuel ratio conditions. We are not sure these efforts will be fruitful, but we are working diligently to solve this problem.

In addition to the Tier II emission standards, the Committee should also bear in mind that the 1990 Clean Air Act amendments continue to provide authority for states with ozone or CO non-attainment areas to adopt California emission standards. On September 28, 1990, the California Air Resources Board (CARB) adopted Low Emission Vehicle regulations (LEV). On February 28, 1991, Governor Cuomo of New York announced that New York State intends to adopt the California LEV program beginning in 1995 (see New York Times article attached). Several other Northeastern states have also expressed interest in adopting this program.

Table II outlines the emission standards required under the LEV regulations, CARB's estimate of the percentages of vehicles required to meet the various standards in given years and projections of the technologies needed to meet each set of standards. As can be seen by examining this Table, a large percentage of vehicles in model years beginning in 1997 are likely to require the use of electrically heated catalyst (EHC) technology.

Toyota has conducted durability testing of EHC technology to determine if it is capable of achieving the extremely stringent tailpipe emission standard required by the California LEV program. At CARB hearings conducted on September 27, 1990, Toyota testified that EHC technology was not mature enough to demonstrate compliance with the required emission standard for 100,000 miles. Indeed, there was evidence of significant structural deterioration

TABLE II

CALIFORNIA LOW EMISSION VEHICLE PROGRAM

MY	94	95	96	97	98	99	2000	01	02	03 & later
	(Approximate % needed to meet mandatory corporate average standard)									
Transitional Low Emission Vehicle TLEV (0.125 gpm) (Reformulated gasoline plus improved emission system)	10	15	20							
Low Emission Vehicle LEV (0.075 gpm) (Electrically heated catalyst/dedicated alternative fuel)				25	48	73	96	90	85	75
Ultra Low Emission Vehicle ULEV (0.040 gpm) (Hybrid electric/ advanced electrically heated catalyst/dedicated alternative fuel)				2	2	2	2	5	10	15
Zero Emission Vehicle ZEV (0.000 gpm) (Electric/Hydrogen)					2*	2*	2*	5*	5*	10*
MANDATORY CORPORATE AVERAGE (g/mile non-methane organic gases)	0.250	0.231	0.225	0.202	0.157	0.113	0.073	0.070	0.068	0.062

*** MANDATED SALES PERCENTAGE**

of the catalyst at 30,000 miles. In addition, Toyota's preliminary testing of EHC technology has shown up to a 7 percent increase in fuel consumption. Development of this system is on-going and future refinements could decrease the negative impact. The primary reasons for any adverse impact on fuel economy are: the added weight of a second battery which is devoted exclusively to the large amount of electricity needed for the proper function of the EHC; the added weight associated with the device itself and heavier components in the vehicle needed for proper functioning of the device; and the extra load placed on the engine due to the need for a heavy-duty alternator to run more often to re-charge the battery devoted to the EHC.

Thus, Toyota, as well as other manufacturers, faces the problem of assuring the EHC technology will achieve the required emission reductions, before the system can be optimized to minimize the adverse fuel economy impacts. There is very little time remaining, and the inability to meet the emission standards means that vehicles cannot be sold in California. Clearly, the top priority must be placed on achievement of emission standards for the required 100,000 miles. Optimization of the system for fuel economy, of necessity, may not occur in a time frame that is sufficient to avoid potential conflicts with unrealistically high CAFE requirements.

The California LEV standards must be considered by this Committee and by any body that establishes future fuel economy standards. In particular, the Committee should consider the fact that the two largest states for auto/truck sales have adopted or announced adoption of the LEV program. To the extent that other states adopt these standards, Toyota estimates that as much as 50 percent of the U.S. market could be subject to the California LEV standards.

Safety

Toyota incorporates state-of-the-art safety technology in its vehicles, and we are proud of our record in the area of vehicle safety. We are happy to see that S.341 includes safety as a consideration in establishing future fuel economy standards.

When considering safety as a factor in establishing future fuel economy standards, the Committee must keep in mind that many safety features add weight to the vehicle. Additional weight makes fuel economy improvements more difficult to achieve. Examples include air bag systems, ABS brakes and new side-impact reinforcements. In addition, all Toyota passenger vehicles use 5 mph bumpers which are heavier than the 2.5 mph systems allowed under federal bumper standards. As standards are added or as systems such as crash avoidance are developed, the increase in weight will work at odds with fuel economy improvements, barring the development of lower cost, high-strength/low weight materials.

Regarding the issue of the safety of smaller vehicles versus larger vehicles, several factors must be considered. First, the laws of physics -- if a smaller moving object is struck by (or strikes) a larger moving object, the smaller object will incur more damage. Second, better maneuverability -- drivers may more easily avoid an accident in a more maneuverable vehicle. Third, the drivers -- drivers of smaller vehicles tend to be younger than those driving larger vehicles. Regardless of the size of vehicle driven, all data indicate that younger drivers are involved in more accidents than older drivers. If younger drivers tend to dominate the smaller vehicle segments, higher accident rates can be expected.

Turning to the Committee's concern about high performance vehicles, Toyota's high-performance models combine advanced safety features (both structural and mechanical) with superior agility and maneuverability. Thus, performance vehicles tend to be at the leading edge of technology. In no way can they be considered to be less safe than lower-performance vehicles.

The Federal Motor Vehicle Safety Standards (FMVSS) clearly provide reasonable and practical levels of safety, regardless of the size of vehicles. These standards are equally applicable to each manufacturer and are based on specified levels of performance, as opposed to design standards. Unlike the FMVSS, the standards resulting from S.341 would not be uniform in application, and would create greater burdens on some manufacturers than others. The FMVSS requires each manufacturer to meet the same level of performance.

At both the February 21, 1991, Senate Commerce Committee hearing on S.279, and the February 28, 1991, hearing before this Committee, NHTSA Administrator Curry articulated a sound position regarding the increase in fuel economy standards. In responding to questions from both Committees, General Curry said benefits from technological improvements should be pushed, but fuel economy benefits derived from significant vehicle downsizing should not be pursued. The differential standard approach embodied in S.341 could lead to significant downsizing for some companies, since this may be the only way high-mileage companies can meet the higher standards created for them by this approach.

Cost Effectiveness of Future Standards

Any future fuel economy standard must consider cost-effectiveness. Again, however, the differential standard approach used in this bill makes it difficult for cost-effectiveness to be considered in a rigorous way. Because the percentage is the same for each manufacturer regardless of the level of technology already achieved in the base year, what is cost-effective for one company may not be for another.

Toyota supports incorporation of cost-effectiveness as a criteria for establishing future fuel economy standards. But we urge the Committee to consider alternatives to the uniform percentage increase approach which make cost-effectiveness a meaningful criteria for all manufacturers. A volume-based or market segment approach could more easily incorporate cost-effectiveness principles in establishing the standards applicable to each class.

III. AUTHORITY TO MODIFY FUEL ECONOMY STANDARDS

Section 11008 would amend the existing law to provide authority for the Secretary to modify standards without submitting the revision to Congress for consideration under the one-House veto approach struck down in the Supreme Court's Chada decision. It is unclear whether under the amended §502(f)(2), the Secretary retains authority to increase standards during the 1996-2001 period or at some point after 2002. If this is the case, manufacturers would have no stability for production planning and only 18 months lead time to adjust for the new standards.

Toyota believes the Secretary should not be authorized to increase standards between 1996 and 2001, and should not be allowed to increase the standards applicable to model year 2002 and later years until at least model year 2007. For any increase in standards, at least five model years lead time should be provided.

IV. MANUFACTURER-SPECIFIC STANDARDS BASED ON THE UNIFORM PERCENTAGE INCREASE

Toyota believes the method set forth in §11006 by which the Secretary of Transportation would set manufacturer-specific MFAFE standards is fundamentally flawed, and should be amended in such a way as to direct the Secretary to establish a system consistent with **all** previous regulation of the automobile industry -- namely, that all manufacturers are required to meet the same standard.

The practical effect of setting MFAFE standards based on uniform percentage increases for each manufacturer is to punish manufacturers that have in the past exceeded the current law by requiring them to meet a much higher standard. To do so, undoubtedly would send industry the wrong message: do not perform better than the law requires lest your good past performance will be held against you in the future. A policy that would most assuredly guarantee that competing companies would avoid performing better than the law requires is inherently bad. Policy directives should encourage manufacturers to perform to the highest level possible, consistent with marketplace demands.

The underlying assumption for establishing different standards for different companies based on past performance is that all companies have applied the same degree of fuel economy technology at precisely the same time, regardless of the size fleet they sell. Thus, companies with a smaller size fleet can just as easily increase the fuel economy of their fleet as companies with a larger fleet. This assumption is incorrect.

Of course size and weight are important factors in determining vehicle fuel economy. But technology also plays a key role in fuel economy improvements.

The Office of Technology Assessment recognized this point and undertook to measure what level of fuel economy should be expected from different manufacturers taking into account the size of their vehicle fleet. As the attached OTA chart (Table III) demonstrates, Toyota's fuel economy significantly exceeded what would have been expected, given our model mix. The OTA analysis clearly demonstrates that those companies that have been leaders in employing fuel economy technology would have a harder task obtaining fuel economy increases in the future because of their aggressive use of technology in the past.

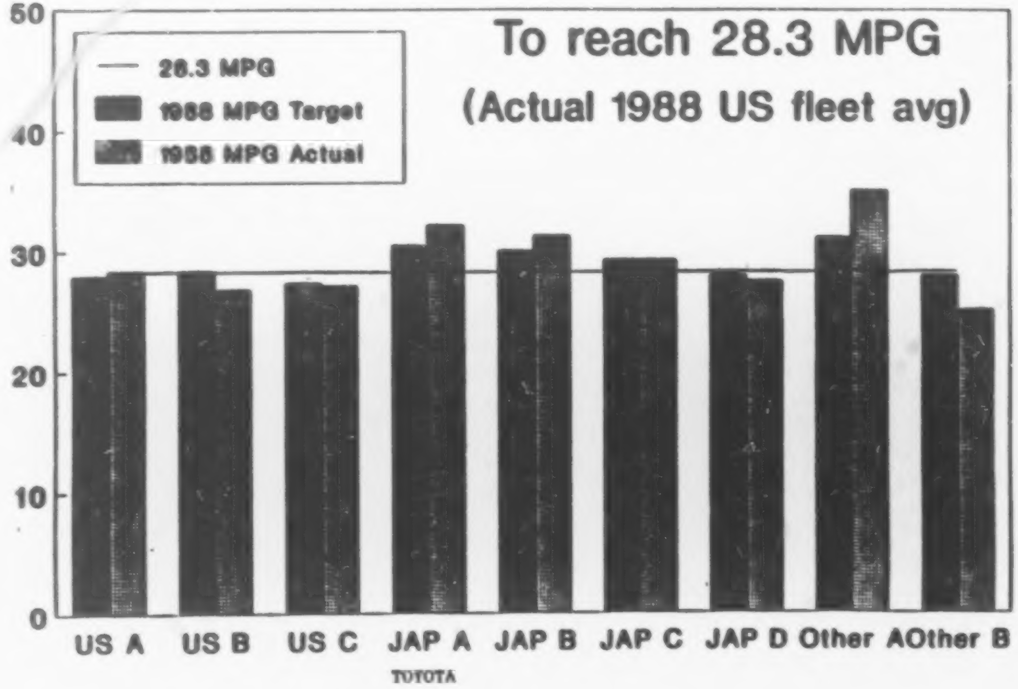
The anti-competitive effects of allowing one company to meet a lower fuel economy requirement by using "off-the-shelf" technology, while at the same time forcing another company to meet a higher standard through radical downsizing and the use of as yet untried expensive technology, would serve to undermine the expressed energy conservation goals of S.341. As high-mileage companies are forced to abandon and reduce sales in certain market segments, these sales will be replaced by lower mileage vehicles from producers with lower fuel economy targets.

The Department of Justice agrees with this analysis, stating, in part, in a letter to Senator Bryan on S.1224 (which was based on the percent improvement concept), "...competition would suffer and the fuel efficiency of a whole category of vehicles could be kept artificially low."

Competition among manufacturers spurs technological innovation. But penalizing technological leaders like Toyota by forcing them into a narrow market segment is antithetical to the advancement of fuel-economy technology across all classes of vehicles. Congress should encourage technological innovation across all model lines. Increasing the difference between high- and low-mileage manufacturers, as mandated by this bill, is counterproductive. Competition will

TABLE III

Size Class Weighted Fuel Economy Actuals vs Targets, 1988



SOURCE: OFFICE OF TECHNOLOGY ASSESSMENT, BASED ON OAK RIDGE DATA be reduced across market segments, thereby removing the incentive for widespread application of best available technology.

The percentage increase approach also perverts any credit system. For example, one company could have a CAFE of 38 mpg yet fall short of its mandated CAFE target and be penalized. Meanwhile, another company could achieve 28 mpg and receive credits simply because it has a lower target. We fail to see the logic in this approach.

V. ALTERNATIVES

In our view, any CAFE program should be based on the following criteria:

- To the extent possible, no company should gain an advantage over any other company by virtue of the type of program selected.
- Fuel economy technology should be advanced across all classes of vehicles.
- The fuel efficiency of the fleet of new cars and trucks should increase.
- The product choice and utility customers want and need from their vehicles should be retained.

One approach that takes these criteria into account is a size class program. Under this approach existing EPA size classes for passenger cars could be used. The sales-weighted average of all vehicles in each class for the most recent model year would be calculated and would serve as a base for future standards. Future standards could be established either by applying percentage or uniform mpg increases for each class of vehicle. The amount of the percentage or mpg could be based on the criteria in S.341. To the extent that there may be anomalies in vehicles in certain classes, a new class could be created to pick up premium vehicles. A company that exceeds the applicable standard in any class could earn credits that are transferable to other classes. This feature adds flexibility for all types of manufacturers.

As for trucks, existing EPA classes for pick-ups could be used, but vans and sport-utility vehicles should be divided into large and small categories (like pick-ups) to better group comparable vehicles. The new standards and credit program would be established in an identical manner to passenger cars.

The approach outlined above groups vehicles that compete against one another every day in the marketplace. It would be vastly preferable to the different standards for different companies approach in S.341, as all manufacturers would be forced to compete vehicle-for-vehicle in the categories in which they produce.

Some have criticized this approach under the belief that manufacturers would simply make bigger cars and avoid the more stringent fuel-economy requirements. As discussed above, there is little market history to suggest this will happen. Over the last decade, the sales mix of vehicles by class (as defined by EPA) has shown little variance. This covers periods with both high and relatively low fuel price conditions. From a manufacturer's perspective, small fuel-efficient car segments are where you capture new buyers that you want to stay with you. No manufacturer is going to willfully abandon those segments of the market. (Ironically, this point was made by Stuart Eizenstat when testifying before the Senate Commerce Committee in favor of S.279.)

Nevertheless, this fear is understandable and can be addressed legislatively. "Carrots and sticks" can be put in a size or market segment program to insure that the desired fuel economy increases do materialize. For example, additional credits for increased sales of small vehicles and "sipper" credits for vehicles that significantly exceed the standard for any market segment could be considered as appropriate "carrots," while a floor fuel economy standard tied to a staggered fee schedule might be considered an appropriate "stick." Combined, these would enhance the fuel economy of the new vehicle fleet.

Another benefit of a size-class or market segment program, or, in fact, any program that sets the same standard for all companies, is that it avoids the real problems involved with the "gaming" which will occur under the percentage improvement approach. The attached chart (Attachment II) illustrates the existing interrelationships among the world's major automakers. Different standards for different manufacturers as mandated under this bill will facilitate rebadging of vehicles with no appreciable fuel conservation benefit. For example, assume that Company A cannot meet the fuel economy standard ultimately established by the Secretary. Company A enters into an agreement with Company B to sell Company B's fuel-efficient cars under Company A's label. The rebadged Company A car takes the place of high mileage Company C's car which is more fuel-efficient but which is now unattractive to consumers because of downsizing or price. No fuel conservation has occurred under this scenario. In fact, fleet fuel economy has declined.

Rebadging is taking place now. It occurs for different reasons. Some companies want to enter into production arrangements for technology transfer, some want to enter into marketing agreements to try and break into additional market segments, some companies need equity and must seek out agreements with other companies. A fuel economy system based on percentage improvement will provide yet another reason for mergers with no fuel conservation benefit. Interrelationships among manufacturers are necessary to compete in today's global market. These relationships should be driven for reasons other than minimizing CAFE standards.

Another form of "gaming" is the issue of new entrants. Under the uniform percentage increase approach, a new entrant could come into the U.S. market with lower fuel economy levels than all other companies competing in a market segment. If the new entrant were to capture a portion of the market from companies with higher fuel economy standards, fleet-wide fuel economy would decrease.

Toyota supports competition in all vehicle classes. We are concerned that any means taken to alleviate the "gaming" problems outlined above could be wildly anti-competitive, and could harm many combinations that may be needed in the future for reasons other than CAFE compliance. These restrictions will harm not only new entrants, but the entire vehicle industry -- foreign and domestic.

A size-class or market segment approach combined with the "carrots" and "sticks" discussed above alleviates these concerns. New entrants or rebadged vehicles meet the standard applicable to the appropriate class. Floor standards keep new entrants from taking over large car markets that would be vacated under the uniform percentage increase approach. And companies would continue to be free to enter into marketing or production agreements/joint ventures for economic reasons, as opposed to purely CAFE-related reasons.

VI. CREDITS

Toyota supports the provisions in S.341 which allow credits earned prior to 1996 to be carried forward for three years and credits earned after 1996 to be carried forward indefinitely. The credit provision in the current law was passed for a reason: to provide an incentive for companies to exceed the standard in order that they could use those credits in years when, for whatever reason, they didn't meet the standard.

Apparently, some have suggested that it would be unfair for credits earned prior to 1996 to be used once the new standards take effect. This, again, is not only unfair, but defeats the expressed desire to improve fuel efficiency. Companies that earn credits between now and 1996 should not be penalized for exceeding the standard. That would totally remove any incentive to exceed the current standard between now and 1996, thereby implicitly encouraging a decline in fleet fuel economy.

On the contrary, we would suggest that any credits earned between now and 1996 be allowed to be used indefinitely after the new standards take effect. This would encourage companies to exceed the current standard to the maximum degree possible, consistent with market forces. If a company has earned credits, and thereby improved the fuel efficiency of the fleet, the credit for exceeding the standard should not arbitrarily end at three years. The conservation benefit does not end after three years. Why should the credit?

Finally, it is important for the Committee to keep in mind the point raised above regarding the perverse effect the differential standard approach caused by the uniform percentage increase has on credits. Companies with vastly higher fuel economy levels than others would be penalized at the rate of $20 per tenth mpg, while companies with significantly lower fuel economy would be earning credits. We see no logic in such a system.

VII. DIFFERENCES BETWEEN CONCEPT AND PRODUCTION VEHICLES

The Committee has inquired about the existence of high-mileage experimental vehicles and the constraints on making these vehicles available to consumers. Before addressing this matter directly, it is important to make very clear the distinction between prototype vehicles and experimental or concept vehicles. A prototype vehicle is one that is close to production; whereas a concept or experimental vehicle is typically a hand-built vehicle which incorporates one or more major design or engineering features that will be tested for possible future use in vehicles. However, some ideas from earlier experimental or concept vehicles produced by Toyota and other manufacturers have never been put into production due to technological or production concerns and/or shifting market demands. It should be noted that often the features included in these experimental vehicles take many years before they can be installed in production vehicles. An example of a prototype vehicle is the Lexus vehicle which was displayed at the Detroit Motor Show shortly before it was introduced for sale by the Lexus Division of Toyota Motor Sales, USA, Inc. in the fall of 1989. An example of an experimental or concept vehicle is the AXV vehicle which was displayed at the 1987 Tokyo Motor Show. The Committee should keep this distinction clearly in mind.

Toyota's AXV has been designed to include technologies that maximize fuel economy: a direct injection diesel engine; CVT transmission; use of new light-weight materials; and, streamlined styling which results in a coefficient of drag of 0.26. As pointed out above, this is an experimental/concept vehicle, as opposed to a prototype vehicle. In other words, far more research and evaluation must be undertaken before one or all of the advanced concepts incorporated into this vehicle can be utilized in production vehicles. This is the very reason for designing this type of vehicle. The difficulties in incorporating the innovations of AXV into production vehicles are shown in Table IV.

VIII. CONCLUSION

Toyota believes S.341 contains a number of positive ideas relating to future fuel economy. This statement has pointed out the most serious problem with this bill, that is reliance on a uniform percentage increase approach for establishing future fuel economy levels. We believe we have suggested constructive alternatives to this approach which will lead to future fuel economy improvements without the anti-competitive, and sometimes perverse, effects inherent in the uniform percentage increase concept.

Toyota looks forward to working in a constructive manner with this Committee to fashion reasonable, effective CAFE requirements for the future.

TABLE IV

THE IMPRACTICALITY OF THE AXV'S FUEL ECONOMY IMPROVEMENT TECHNOLOGY FOR PRODUCTION VEHICLES

TECHNOLOGY	REASONS WHY
Direct Injection Diesel Engine	1. Noncompliance with NOx and particulate emission standard. 2. Noise level above engineering standards. 3. Low market demand for diesel powered vehicles. 4. Engine vibration level above engineering standards.
CVT (Continuously Variable Transmission)	1. Need of improving the belt durability. 2. Low torque sufficient only for small vehicles.
Light-Weight Materials Resin...Body Panels, Windows FRP* . . . Suspension, Steering, Chassis Components Aluminum . . . Engine Block *Fiber Reinforced Plastics	1. Large cost increases. 2. Insufficient long-term durability.
Streamlined Styling	1. Incompatible with space utility and styling design. 2. Difficult to assure cooling performance.

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Cuomo Plans Tougher Rules On Emissions

New Controls Expected To Add to Costs of Car

By ALLAN R. GOLD

Six months after revising its vehicle-emission controls to match California's strict rules, New York State plans to go further and match the even tougher limits California is to put in place in 1995, Gov. Mario M. Cuomo said yesterday.

The rules will mean cleaner air but more expensive cars for New Yorkers, state officials said.

Under the program, the state estimates that an additional 30,000 tons of pollutants a year will be kept out of the air by 2000. The emission controls will add an average of $150 to the cost of a car, coming on top of $150 from the rules adopted last fall, state officials estimate.

Thomas C. Jorling, the State Commissioner of Environmental Conservation, said that the state had no choice but to adopt the stringent 1995 rules once California adopted them.

Obligated to Toughen Standards

Under the Federal Clean Air Act, only California has the right to set its own emission standards. Other states have the option of following California or pursuing the national standards, which are more lenient. Because New York choose to follow stricter guidelines than those set by the Clean Air Act, it was obligated to toughen its standards after California did.

Adoption of the California standards "is the most cost-effective means available to reduce air pollution in New York State," Mr. Jorling said in a statement released in Albany.

"Without significant additional reductions in mobile-source pollution, New York will be forced to place severe controls on industry and restrict both vehicle use and industrial growth," he said.

Last September, New York adopted California standards for model-year 1993 that require automobile manufacturers to reduce emissions of smog-causing substances and to make vehicles' emissions-control equipment more durable. Since then, California has further tightened its standards and is moving toward vehicles that emit very few pollutants. California has the nation's worst air quality.

There are some differences between New York's and California's 1995 rules. California is setting levels for how many of its cars have to meet its cleanest standards for each year after 1995. New York is leaving the timing of the introduction of the cars to the discretion of manufacturers — hoping, state officials said, that the pressure to meet the requirements in the huge California market will lead to the cleaner cars being made available here as well.

California has the largest new passenger car market in the nation. New York is third, after Florida, according to 1989 information from the Motor Vehicle Manufacturers Association.

The state will hold hearings on the pro-

Continued on Page B2

New York's Emissions Rules To Be Tightened Some More

Continued From Page B1

posed emissions regulations in the spring. The rules are to be finished by December, Mr. Jorling said.

Emissions standards regulate the amount of pollutants like hydrocarbons, oxides of nitrogen and carbon monoxide that a vehicle can discharge from its tailpipe. Smog is formed when hydrocarbons and oxides of nitrogen mix in the atmosphere in the presence of sunlight.

Resisted in the Past

Almost half of the hydrocarbon emissions come from with cars and trucks. The New York metropolitan area violates Federal health standards for smog and carbon monoxide, which is a product of incomplete engine combustion.

Telephone calls to spokesmen for automobile manufacturers on New York State's new antipollution plans were not answered yesterday evening.

In the past, the manufacturers have resisted state efforts to adopt the California standards. In January, they sued the state, asserting that the 1993 California standards could not be adopted without legislative approval. Mr. Jorling says the lawsuit, which is pending, is without merit.

A state Senate Environmental Conservation Committee hearing on adoption of the 1993 standards is scheduled at 10:30 this morning in the Suffolk County Legislature Auditorium in Hauppauge.

Under the new, tougher standards, owners of fleets of vehicles like taxis will be required to operate the lower-emitting cars by 1996, Mr. Jorling said. If the state is unable to meet Federal pollution standards toward the end of the decade, a mandatory phase-in schedule for lower-emitting vehicles, like that of California, will be imposed, he said.

Such a system would require making low-polluting fuels available as well, something that will also be required in California if that state is to meet its ambitious emissions standards.

Attachment II

1991 INTERRELATIONSHIPS AMONG AUTOMAKERS

General Motors (USA)

	E	J	S	MD	T	MA
Bertone						●
Chrysler		●			●	
Daewoo	●		●	●	●	●
Fiat		●	●			
Ford		●			●	
Honda			●			
Isuzu	●	●	●	●	●	●
Nissan		●	●			
Pininfarina			●		●	●
Renault			●			
Rover			●			
Saab		●	●	●		
Suzuki	●	●	●	●	●	●
Toyota		●	●	●		●
VEB Auto Works						●
VAZ			●			
Volvo		●				●

Ford (USA)

	E	J	S	MD	T	MA
AC Cars	●					
Aston Martin	●					
BMW						●
Chrysler					●	
De Tomaso			●			
Fiat		●	●	●		●
GM		●			●	
Jaguar	●					
Kia	●			●		●
Mazda	●	●	●	●	●	●
Mercedes-Benz						●
Nissan		●	●		●	●
Rover						●
Suzuki				●		●
Toyota		●				
Volkswagen		●	●			●
Volvo		●				

Chrysler (USA)

	E	J	S	MD	T	MA
Beijing Auto		●	●		●	
De Tomaso	●		●		●	●
Fiat		●		●		
Ford					●	
GM		●			●	
Honda				●		
Mitsubishi	●	●	●	●	●	●
Renault			●	●	●	
Rover			●			
Steyr-Daimler-Puch			●		●	●

Toyota (Japan)

	E	J	S	MD	T	MA
CNAIC						●
Daihatsu	●		●	●	●	●
Ford		●				
GM		●	●	●		●
Nissan		●				
Renault		●		●		
Volkswagen				●		●

Nissan (Japan)

	E	J	S	MD	T	MA
Daewoo			●	●	●	●
Fiat					●	
Ford		●	●		●	●
Fuji Heavy (Subaru)	●		●			
GM		●	●			
Mazda			●			
Mitsubishi		●	●			
Peugeot			●			
Second Auto Works			●			●
Siam Motors	●					●
Toyota		●				
Volkswagen			●	●		
Yue Loong	●		●			●

Honda (Japan)

	E	J	S	MD	T	MA
Chrysler				●		
GM			●			
Mercedes-Benz				●		●
Mitsubishi		●				●
Peugeot			●			●
Rover	●		●		●	●

Volkswagen (Germany)

	E	J	S	MD	T	MA
AZNP	●		●	●		
CNAIC		●	●			
Fiat					●	
First Auto Works			●		●	●
Ford		●	●			●
Mercedes-Benz		●				
Nissan			●	●		
Porsche					●	
Renault			●			
Rover			●			
Shanghai Auto Works		●				
Steyr			●		●	●
Toyota				●		●
Volvo			●			
VEB Auto Works		●	●		●	

Fiat (Italy)

	E	J	S	MD	T	MA
Chrysler		●		●		
De Tomaso	●	●		●		●
Ford		●	●	●		●
Fuji Heavy (Subaru)			●			
GM		●	●			
Mazda				●		
Nissan					●	
Peugeot		●	●			●
Pininfarina						●
Polmot FSM			●		●	
Steyr			●			
Volkswagen					●	
Zastava	●		●		●	●

TYPE OF RELATIONSHIP
(As of January 1991)

E = Equity Arrangement
J = Joint Venture
S = Supplies or Buys Major Components
MD = Marketing/Distribution Arrangement
T = Technology Arrangement
MA = Manufacturing/Assembly Arrangement

Peugeot (France)

	E	J	S	MD	T	MA
CAC				●		●
Daihatsu		●			●	
Fiat		●	●			●
Honda			●			●
Isuzu						●
Mazda				●		
Nissan			●			
Pininfarina						●
Renault		●				●
Rover		●		●		
Steyr			●			
Suzuki		●		●		
Volvo			●			

Mazda (Japan)

	E	J	S	MD	T	MA
Cycle & Carriage Bintang				●		●
Fiat				●		
Ford	●	●	●	●	●	●
Isuzu		●				
KIA	●	●	●	●	●	●
Mitsubishi			●			
Nissan			●			
Peugeot				●		
Suzuki			●			●

Mitsubishi (Japan)

	E	J	S	MD	T	MA
China Motors						●
Chrysler	●	●	●	●	●	●
Honda		●				●
Hyundai	●		●	●	●	●
Isuzu						●
Mazda			●			
Mercedes-Benz		●		●	●	
Nissan		●	●			
Proton	●		●		●	
Suzuki			●		●	

Mercedes-Benz (Germany)

	E	J	S	MD	T	MA
CNAIC			●		●	
Cycle & Carriage Bintang				●		●
Ford						●
Honda				●		●
Mitsubishi		●		●	●	
Porsche			●		●	●
Volkswagen		●				

BMW (Germany)

	E	J	S	MD	T	MA
Bertone			●			
Daihatsu			●			
Ford						●

Volvo (Sweden)

	E	J	S	MD	T	MA
Bertone					●	●
Daewoo				●		
Ford		●				
Fuji Heavy (Subaru)			●	●		●
GM		●				●
Isuzu				●		
Peugeot			●			
Renault	●		●		●	
Volkswagen			●			

Renault (France)

	E	J	S	MD	T	MA
Chrysler	●		●		●	
GM			●			
Peugeot		●				●
Toyota		●		●		
Volkswagen			●			
Volvo	●		●		●	

TYPE OF RELATIONSHIP
(As of January 1991)

E = Equity Arrangement
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T = Technology Arrangement
MA = Manufacturing/Assembly Arrangement

Source: "How World's Automakers Are Related – 1991 Edition," by Ward's Automotive International

The CHAIRMAN. Thank you, Mr. Olson.
Mr. DeCicco.

STATEMENT OF JOHN DeCICCO, ON BEHALF OF THE AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY, ACCOMPANIED BY HOWARD GELLER, EXECUTIVE DIRECTOR

Mr. DECICCO. Thank you, Mr. Chairman. First of all, I would like to thank you and other sponsors of the bill for offering legislation that has the potential to increase light-vehicle fuel economy substantially. This is, we believe, the single most important policy step that can be taken to address the energy, environmental, and national security problems associated with transportation in the United States.

We welcome the opportunity today to give suggestions to the committee so that the CAFE provisions of Senate 341 might be developed to give Americans an assurance that this potential for reducing oil use and saving money consumers is realized. I want to emphasize five points today, and let me quickly go through them now. I will elaborate on them, and then invite questions for further elaboration later.

First, I want to talk about the need for a legislative numerical target and offer suggestions on what we think that target should be.

Secondly, I am going to address the performance requirements, restrictions that are in the bill and give some concerns we have about those.

Thirdly, I am going to talk about the issue of consumer preferences, and the market—what the market will bear in terms of what could be done.

And in that regard, my fourth area in my written testimony I presented a list of what we call policy complements to CAFE, other policy instruments that can be considered to help address some of the problems—challenges—that are associated and that have been raised by the automakers and others.

And then the final area, I will make a few comments on the safety aspects of fuel economy and how we feel that some of the debate on that has been very misleading.

Going into the numerical targets, we support specifying CAFE as a uniform percent increase. In fact we believe that the so called CAFE 40—40 percent uniform increase by 2001 that is contained in S. 279 is cost effective and technically achievable by a wide margin.

We base our analysis on studies done by colleagues of ours, Mr. Mark Ledbetter, and Professor Mark Ross, who have based their analysis on the same set of technologies used by Mr. Duleep at EEA, as well as then making adjustments for some of the things in your bill such as technologies that can be brought in as well as adjustments on doing the cost effective calculation in a way we feel is more appropriate.

That number which we have in our written testimony and which we have testified—ACEEE has testified on a number of previous occasions—is that a CAFE target of around 44 miles per gallon is achievable in the 2001 time frame.

The CHAIRMAN. Are you going to tell us how you disagree with Mr. Duleep?

Mr. DECICCO. Yes. In preparing for this hearing, I thought about how even our numbers are we feel conservative in some ways, in light of the flexible fuels credit, in light of the life-cycle costing, and also in light of some technical engineering issues related to when you add up percentage increases.

In adjusting our conservative 44-mile-per-gallon number for those things, we feel that a number on the order of 48.5 miles per gallon is also certainly not out of the pale in this debate. I think it is important for the committee to be aware that, with adjustments and broadening the technology set, that miles-per-gallon numbers in the 40 range are very feasible.

Secondly, on the performance requirements, as has been noted, we have seen a trend towards increasing the performance of cars in terms of top speed and acceleration ability as well as a trend towards increasing weight.

We believe that CAFE legislation should not base itself on either a presumption of increasing trends in this direction or even the 1990 levels.

It is not sound public policy, we believe, to base regulations on the whims of consumer tastes and the marketeering strategies of dealers and manufacturers. I have never heard of anyone discussing environmental or national security problems resulting because our cars are not quick enough off the block or because their top-speed capabilities are too low.

For that reason, as crafted, we feel that S. 341 has more to do with mandating levels of performance that it does to do with achieving levels of fuel economy.

We therefore feel that those restrictions are unnecessarily confining and therefore stick with basing our analysis on performance levels of the 1987-1988 era.

Finally, on the issue of consumer preferences, testimony was given before the Commerce Committee about American public opinion poll about what Americans feel about a fuel economy. Over 80 percent feel that fuel economy should be mandated. 90 percent of those who feel that said that they are willing to pay up to $500 more for those increases.

So, we believe that there is in the market place and among American consumers a desire for greater fuel economy.

[The prepared statement of Mr. DeCicco follows:]

TESTIMONY OF
JOHN DECICCO AND HOWARD GELLER
AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

ON THE

CORPORATE AVERAGE FUEL ECONOMY (CAFE)
PROVISIONS OF THE
NATIONAL ENERGY SECURITY ACT OF 1991
(S. 341)

20 MARCH 1991

1. INTRODUCTION

Good morning, Mr. Chairman and members of the Committee. I am here representing the American Council for an Energy-Efficient Economy, a non-profit organization dedicated to advancing technologies, programs, and policies that improve energy efficiency.

Since 1976 the fuel economy of passenger cars has improved from 17 mpg to 28 mpg, and the fuel economy of light trucks has improved from 17 to 21 mpg. Had this improvement not occurred, cars and light trucks in the United States would now be consuming an additional 2.5 million barrels of oil per day and drivers would be spending at least an additional $40 billion per year for gasoline. Moreover, higher oil demand over the years would have exerted upward pressure on world oil prices, which would have markedly slowed the international economic recovery during the 1980s. The improvement in light vehicle fuel economy since the early 1970s has been nothing short of spectacular. The economic, environmental, and national security benefits of this improvement are immeasurable.

Unfortunately, much of the progress made by the United States during the 1970s and early 1980s in reducing oil imports is being rapidly undone. The net import share of U.S. oil consumption has shot up from 27% in 1985 to about 45% in 1990. These imports cost the United States about $50 billion in 1990.

The fifteen-year trend of rising light vehicle fuel economy that has held total fuel consumption by light vehicles in check has come to a halt. Low gasoline prices, rollbacks of fuel economy standards, and a cessation in the rise of the fuel economy threshold for gas guzzler taxes have removed the incentives for manufacturers to improve fuel economy. New car fuel economy almost doubled from 1973 to 1988, peaking at 28.6 mpg, but since 1988, new car fuel economy has decreased 3%. New light truck fuel economy peaked at 21 mpg in 1987 and has also subsequently fallen by 3%.

Underlying the growth in light vehicle fuel consumption is the seemingly inexorable increase in the motor vehicle use, as measured by the number of vehicle miles traveled (VMT) in the United States. A plot of VMT growth since 1935 shows a very steady, rapid increase in VMT, with the two major oil crises of the 1970s represented by very small, temporary shifts in the upward trend, as shown in Figure 1. Recent analysis of the factors driving the growth in VMT indicates that VMT will continue to grow at about 2.5% per year over the next ten years.[1]

Furthermore, the on-road fuel economy of new cars and light trucks is falling further and further behind their EPA-rated fuel economy. New vehicle on-road fuel economy is currently estimated to be 15-20% lower than the EPA rating.[2] Analysts project that because of growing urban congestion, higher highway speeds, and a larger ratio of urban to highway miles, on-road fuel economy could fall 30% below EPA ratings by the year 2010. Considering this ongoing degradation of on-road efficiency, the present trend of declining fuel economy is even greater than the 3% drop since 1988 observed in the EPA mpg ratings.

Another factor contributing to increasing oil use is the growing number of light trucks in the U.S. light vehicle fleet. On average, new light trucks are rated at 21 mpg, 26% below the 1988 new car average of 28.6 mpg. While light trucks comprised only 15% of new light vehicle sales in 1970, they now account for one-third of sales, and their popularity is projected to increase even more. The large majority of light trucks--73% according to the most recent survey--are being used for personal transportation.[3] As defined for this Commerce Department survey, personal transportation means "operated as a personal-use vehicle in place of an automobile for pleasure driving, travel to work, etc. (no business use)." Thus, while most light trucks serve the same purpose as a car, they operate with much lower fuel economies.

Taken together, stalled fuel economy improvements, rapidly growing VMT, increasing traffic congestion, substitution of trucks for cars, and other factors are causing light vehicle petroleum consumption to grow so rapidly that it will outstrip any other efforts to rein in petroleum imports. At stake are national economic health, security, and the Earth's climate. Among the many actions that can be taken to improve U.S. energy efficiency and national security, increasing the fuel economy of light vehicles should be a top priority.

2. MARKET FORCES ARE INSUFFICIENT TO GREATLY IMPROVE FUEL ECONOMY

If market forces could fix the problems outlined above, there would be little reason for congress to consider policy measures to address the issue. However, there are compelling reasons to conclude that the market will not solve the problem.

Presently, the cost of fuel represents only about 12% of the lifecycle cost of operating a new car. Fuel economy is thus of relatively low importance in new car purchase decisions. Further increases in fuel economy will of course reduce annual fuel costs, but this reduction will be partially offset by the increased capital costs of a fuel economy improvement. For example, purchasing a 35 mpg car instead of a 30 mpg car will reduce annual fuel costs only about $50 per year. Subtracting the extra annual capital cost of the higher fuel economy car leaves little savings, roughly $25, to the buyer of the 35 mpg car. A car buyer thus has a very weak incentive to purchase a high fuel economy vehicle. This situation is true at today's new automobile fuel economy levels and higher, even with fuel prices that are double or triple their current level. (See Figure 2.)

Other evidence that higher fuel prices will not push passenger car fuel economy into the 40 mpg range is found in industrialized countries with gasoline prices that are two to four times higher than U.S. prices. Table 1 compares fuel economies and gasoline prices in selected countries. As can be seen, much higher fuel prices aren't necessarily associated with significantly higher fuel economies. Even though Japan's 1988 price of gasoline was more than triple the U.S. price, their light vehicle fuel economy was slightly lower than our's (but the number of vehicle per capita in Japan is less than half that in the U.S.).

We are not arguing that higher fuel prices will not increase automobile fuel economy. They can clearly play a role, as they have in the past, but it is clear that fuel prices alone are an insufficient motivator for improving fuel economy to levels that are cost-effective from a social perspective. Policy measures will be needed to improve fuel economy to these levels.

Table 1 An international comparison of gasoline prices and fuel economies for new automobiles in 1988

	Gasoline Price (U.S. dollars)	New Vehicle Fuel Economy (miles/gallon)
United States	0.95	28.3
West Germany	2.18	30.9
France	3.04	35.8
Japan	3.47	27.3
Norway	3.09	31.8
Italy	3.90	34.1

Sources: World Resources Institute and Lawrence Berkeley Laboratory

3. A SUBSTANTIAL INCREASE IN CAFE IS COST EFFECTIVE

Much of the current debate on fuel economy standards has focused on what levels of fuel economy are technologically feasible and cost effective. ACEEE recently published a paper addressing this issue.[4] The paper investigated a number of fuel economy technologies to estimate how much new car fuel economy could be improved by the year 2000, and how much of this improvement is cost-effective for the car-buying public. The list of technologies analyzed is based on the list compiled by Energy and Environmental Analysis (EEA) for the Department of Energy.[5] Two technologies not included in EEA's were included in ours: aggressive transmission management and idle-off. All of the technologies analyzed are well-understood, and most have already been commercialized.

The analysis posed a scenario in which the technologies were rapidly adopted to the fullest extent possible. The results indicate that if average automobile size and acceleration performance were held constant at their 1987 levels, new car fuel economy could cost-effectively be improved to 44 mpg by the year 2000, at an average cost of 53 cents per gallon of gasoline saved. (In other words, if the increase in the purchase price due to fuel economy improvements were spread over the expected gasoline savings, and discounted to present value, the cost would amount to 53 cents per gallon.) Compared to the current price of gasoline, that's a pretty good deal. The deal looks even better as gas prices rise in the coming years, as projected by the Department of Energy.

3.1 Further improvements are on the near horizon

The list of technologies included in our analysis is far from exhaustive. For example, advanced diesel and two-stroke engines are not included, nor are advanced electronic controls, variable valve timing, or turbocharging- and super-charging. It is likely that with adequate incentives for improvement, these technologies could start coming on the road within the next decade. Including these and other technologies would increase the cost-effective and technically possible level of fuel economy. On the other hand, the analysis does not adjust for more stringent future emission and safety standards, nor does it account for the fact that cars are now more powerful, larger, and heavier than they were in 1987. Adjusting for new standards, and using the larger, more powerful 1990 cars as the base instead of 1987 cars would decrease the cost-effective level of fuel economy. On balance, however, we believe that including additional technologies and adjusting for the above factors would result in a higher cost-effective level of fuel economy than the 44 mpg estimate reported here.

The results of the ACEEE cost-benefit analysis were compiled into a "supply curves of conserved energy" for the years 2000 and 2010, which reveal how much energy can be saved by a given year and at what cost. By doing this, oil savings obtained through fuel economy improvements can be put in the same analytical framework used for energy production projects. As can be seen in Figure 3, increasing fuel economy to 44 mpg would save 2.1 quads (about 1 million barrels per day) by the year 2000, at a marginal cost below the projected cost of gasoline in the year 2000. Since fuel saved is equivalent to fuel produced, the economically rational decision is to invest in improving vehicle efficiency up to the point where its marginal cost equals that of the next best alternative (i.e., buying fuel at a given price).

3.2 Increasing speed and acceleration performance hurts fuel economy

Engineering improvements have led to a remarkable 50% improvement in the average horsepower per unit of engine displacement in new cars since 1975.[6] Since 1982, a large part of this technological advancement has been used to make cars more powerful and faster, instead of improving fuel economy. Average engine horsepower has gone up steadily since 1982 and average acceleration time (0 to 60 miles per hour), has dropped from 14.4 seconds to 12.1 seconds. Moreover, drag coefficients have also decreased, which, coupled with the more powerful engines, gives today's cars top speed capabilities far in excess of those needed for safe driving.

Other things held equal, a reduction in acceleration time causes a decline in fuel economy. Using an EPA-developed estimate of the relationship between fuel economy and acceleration performance, we estimate that the surge toward faster cars since 1982 has decreased new car fuel economy by about 10 percent.[7] Had car and light truck acceleration levels remained at 1982 levels, other things being equal, we would now be consuming 240,000 barrels per day less oil, nearly the same as the expected rate of oil production from the Arctic National Wildlife Refuge (assuming Department of Interior estimates of recoverable resource are correct). Even if present trend of increasing power performance were to flatten out today, the annual additional rate of oil consumption due to the changes in the fleet since 1982 will grow to 500,000 barrels per day by 1996.

Car manufacturers may claim that they are merely responding to consumer demands when they direct their technological advances into making cars more powerful rather than more fuel efficient. However, the world is not so simple: if consumer choices were simply a given, manufacturers would not spend so much on advertising. In part, manufacturers have helped create the apparent demands of carbuyers by heavily promoting "hot" cars or "muscle" cars and by dangling the lures of rapid acceleration and top speed capability. We do not believe consumers will balk if automakers redirect both their technical and their marketing skills to promoting higher fuel rather than power performance. Indeed, a recent national opinion poll showed broad, bipartisan support for increasing CAFE standards. Over 80% of Americans favor increasing standards to the CAFE-40 levels proposed by S. 279 and nearly 90% of those favoring the new standards said that they will still support the standards even if it means adding $500 to the cost of a new car.[8]

3.3 Social and environmental costs justify even higher CAFE levels

It is important to note that none of the indirect costs of producing oil and maintaining the source of supplies are included in the foregoing analyses. A full-cost benefit analysis should incorporate these factors, which include air pollution, oil spills, habitat destruction, and national security costs. Although some of these costs are difficult to quantify, their overall impact would certainly be to raise the price threshold for marginal cost comparisons and therefore to significantly raise the mpg level at which fuel economy improvements are cost effective.

4. FEDERAL POLICIES ARE NEEDED TO IMPROVE FUEL ECONOMY

Because market forces are not sufficient to raise light vehicle fuel economy to the cost-effective level, government intervention is necessary. Increasing the CAFE levels through standard setting is the single most effective and reliable policy tool available. However, no one policy measure can be fully effective in increasing fuel economy to the nationally beneficial levels. A complementary set of policies, all aimed at the same goal, is the most effective way to proceed. We recommend the following.

4.1 Increase CAFE standards

First and foremost, higher fuel economy standards must be enacted. The technical information available today fully justifies the specification of quantitative fuel economy targets in legislation. Further study will be useful in order to clarify the achievable potential in the post-2001 years, but no further study is needed to determine cost-effective targets for 2001 and earlier. We fully support a uniform percentage increase approach directed toward achieving a 40% increase in CAFE by 2001, referenced hereafter as "CAFE-40" (such a proposal is contained in S. 279, introduced by Senators Bryan and Gorton). As noted above, the CAFE-40 improved fuel economy standard is technically feasible and cost-effective by a wide margin.

Basing the new standards on percentage increases for each manufacturer is the fairest practical way to allocate both the financial and technological requirements for improving fuel economy among the manufacturers. The argument that percentage increases unfairly burden manufacturers with higher-than-average fuel economy is simply obfuscation. Our cost benefit analysis fully reflects automakers' needs to recover the development and manufacturing costs for the new technologies used to achieve the cost-effective mpg levels--these costs are passed on in the retail price of the new vehicles. Our penetration rates reflect the lead times needed to make the necessary design, retooling, and production changes needed to introduce new models using the more efficient technologies.

A technology assessment that attempts to look at the future is, of course, subject to uncertainties. Nevertheless, the information used in our analysis is the information which we judge to be the best available. The fact that our nominal estimate of a cost-effective level in the year 2000 is 44 mpg easily provides an adequate safety margin for setting a standard of a 40% improvement by 2001.

If the fuel economy goals of a CAFE-40 proposal are fully achieved by 2001, oil consumption will be 2.5 million barrels per day (Mbd) lower in the year 2005 than if new car fuel economy remains at today's level. (A discussion of the assumptions behind this savings estimate is included as an appendix to this testimony.) In addition, consumers would save about $30 billion per year, net of the costs of fuel economy improvement. Annual oil and consumer savings will grow after 2005 as the high-mpg vehicles comprise a larger share of the total vehicle fleet.

4.2 Increase the gas guzzler mpg threshold

Second, Congress should increase the fuel economy threshold for the gas guzzler tax. Presently, only cars that fall below 22.5 mpg are subject to the tax. The gas guzzler tax threshold should be increased by the same percentage as the CAFE standards, so that a strong mechanism exists for pushing up the bottom end of the fleet.

The gas guzzler tax has been overlooked as an effective policy tool for improving fuel economy. However, there is strong evidence that the gas guzzler tax played an important role in improving fuel economy, especially between 1983 and 1986. Figure 4 shows a plot of the average fuel economy of cars whose average fuel economy was below 21 mpg in 1980, the year before the gas guzzler tax took effect. Also plotted on the graph are the gas guzzler tax threshold and the real price of gasoline for the years 1980 through 1987. As can be seen, the fuel economy of low-mpg cars rose after the guzzler tax threshold was raised high enough to pose a tax threat. Manufacturers clearly decided it was more economic to improve fuel economy than to even pay a small gas guzzler tax. This improvement in fuel economy occurred during a period of sustained decreases in the price of gasoline. As can be seen in Figure 5, this improvement in low-mpg cars occurred when the fuel economy of the remainder of the new car fleet hardly improved, suggesting that the gas guzzler tax played a major role in post-1983 fuel economy improvements.

Gas guzzler taxes have a number of desirable features. Since the tax only applies to new cars, low-income persons are largely unaffected by the tax. Since the tax is a large penalty imposed at the point of automobile purchase, instead of very small sums stretched out over many years (as is a fuel tax), it is likely to have a very strong effect on the willingness of cars buyers to avoid lower mileage cars. We also recommend that a gas guzzler tax be established for light trucks, with perhaps an exemption for *bona fide* farm and commercial truck users. As for passenger cars, the guzzler threshold should be increased by the same percentage as the overall fuel economy standard.

The recent increase in the gas guzzler tax will have very little impact on the fuel economy of cars sold in the U.S. because the fuel economy threshold for the tax was not increased. Only the amount charged for falling below the threshold was modified, and since the threshold is presently so low that it only applies to imported luxury cars, the overwhelming majority of cars sold in the U.S. will remain unaffected by the tax change.

4.3 Institute fees and rebates linked to fuel economy

Further benefit can be obtained by extending the present gas guzzler tax to a gas-guzzler/gas-sipper fee/rebate incentive system. Such incentives to influence car buyers' preferences for fuel economy can be useful in lowering the risk to manufacturers who are concerned about sales of their more efficient models. Various proposals, some modeled after the DRIVE$^+$ program developed in California,[9] have been put forward. DRIVE$^+$ address fuel economy and tailpipe emissions. A system based only on fuel economy may be politically infeasible because of the current characteristics of domestic versus imported vehicle fleets. However, a system based on fuel economy along with some other physically based measure of vehicle amenity, such as size, holds promise as a way to offer an incentive for automobiles better optimized for fuel economy and utility.

A full analysis of the fuel savings impact of such a fee/rebate system is yet to be completed, but have made rough calculations to estimate the magnitude of the effect. Assuming that such a system results in a 5% improvement in achieved CAFE levels by 2001 rising to 10% by 2010, the additional savings in 2005 would be 0.34 Mbd, or a 13% improvement over the savings from CAFE alone. Thus, since a practical fuel economy related fee/rebate system will have a smaller effect on fuel economy than a CAFE-40 improvement, it must be viewed as a complement to CAFE, not a replacement.

4.4 Institute "truth in testing" for fuel economy ratings

As noted in the introduction, there is a significant and growing discrepancy between the rated fuel economies of light vehicles and the fuel economies actually experienced by consumers. The gap between the two is currently about 20% and is projected to reach 30% by 2010.[10] What this means is that, even though the 1990 new car fleet has an average EPA rating of nearly 28 mpg, the actual on-the-road fuel economy of the new cars is really only around 23 mpg. The discrepancy is caused primarily by congestion, as well as an increasing share of urban driving and higher highway speeds. Closing the gap by requiring that a new test procedure be developed and phased in, so that the rated fuel economy matches the on-road performance, would yield significant increases in oil savings. ACEEE recommends that a CAFE legislation include mandate for EPA and DOT to revise the test procedures so that the fuel economy rating on a car's sticker more accurately represents to the consumer the actual fuel economy performance of the car.

Implementing truth-in-testing will involve (1) research to specify a test procedure which more accurately reflects typical driving patterns and (2) a plan for phasing in the new test procedure, so that consumers and automakers can adapt to the new ratings. To close the gap at a given standard level, a vehicles would need some combination of intrinsically higher efficiencies and operating characteristics that are better optimized for driving in congested, urban conditions. We recognize that a full phase-in will take some time, to allow the requisit adaptations. Moreover, the effects of truth-in-testing on fuel consumption will not be fully realized until vehicles rated under the current, inaccurate system are nearly all retired from service. Truth-in-testing should therefore be implemented immediately, otherwise the gap between on-the-road and rate fuel economies will continue to erode the oil savings potential of fuel economy standards. We estimate that a phase-in aimed to completely close the gap by 2010 would, in combination with a 40% increase in rated fuel economy by 2001, yield savings of 4.1 Mbd in the year 2005, or a 64% increase in the savings over CAFE-40 alone.

4.5 Fund a competition to produce ultra-efficient vehicles

Another potential policy complement to CAFE is a federally sponsored challenge or competition for the development and marketing of ultra-fuel efficient vehicles. The incentives to manufacturers of qualifying could include substantial cash awards as well as rebates for each advanced vehicle sold. Such an initiative would shift some of the risk and cost burden away from manufacturers and onto the public, as well as create a level of public awareness and excitement that will enhance buyer preferences for automotive efficiency. A draft paper on this idea, termed the Advanced Automotive Development Challenge, is attached as an appendix to this testimony. Funding for such an program could come from gas guzzler taxes, gasoline taxes, or an oil import fee.

4.6 Increase gasoline taxes

Finally, higher gasoline taxes would help to push the market in the direction of higher fuel economy. As indicated earlier, a gasoline tax, even a relatively large one, will not by itself be able to push fuel economy into the 40 mpg range. But it will help create the consumer demand for fuel efficiency that will support manufacturers' efforts to improve fuel economy. ACEEE supports a 50 cent/gallon increase in the federal gasoline tax, phased in over several years if necessary. If such a tax were adopted, low income households should be provided with rebates to offset any regressive impacts of such a tax increase.

The above combination of policies would both require manufacturers to produce fuel-efficient vehicles and encourage consumers to buy those cars. Instead of being subjected to the roller coaster of world oil prices, and weak, uneven consumer demand for fuel efficiency, manufacturers would know what minimum levels of fuel economy to plan for, and they would know that consumers would have strong incentives to buy those cars.

5. CAFE IS COMPATIBLE WITH SAFETY

Opponents of efforts to improve automobile fuel economy have argued that CAFE standards increase highway fatalities. This argument is misleading in that it ignores the historical record of simultaneous improvements in both safety and fuel economy. It is disingenuous when made by an administration and automakers more noted for foot-dragging than leadership on safety issues. Indeed, significant improvements in CAFE have the full support of the leading public interest advocates for auto safety, including the Center for Auto Safety.[11]

5.1 CAFE has not and need not substantially reduce car sizes

Fuel-efficient cars are commonly equated with small, light cars. While on average a small car can be more efficient than a larger car, the fuel economy technologies needed for reaching the levels of CAFE-40 do not involve downsizing. Moreover, the record shows that fuel economy can be substantially increased without reducing vehicle weight. Average new car fuel economy began to improve sharply after 1974. Initially, much of this fuel economy improvement was due to reducing average vehicle weight. It was the easiest and cheapest way for manufacturers to improve fuel economy. Between 1980 and 1988, the average vehicle weight remained almost constant, while the fuel economy increased by over 20%. (See Figure 7.) Manufacturers were able to improve fuel economy without reducing vehicle weight by relying on technological improvements in engines, transmissions, aerodynamics and other means.

Similarly, the record shows that vehicle fuel economy can be increased substantially without reducing vehicle size. Figure 8 shows the results of an analysis that separated the effects of size and non-size (design) changes on fuel economy.[12] As can be seen, increased market share for smaller cars only explains a small percentage of the overall fuel economy improvement since 1977. Average automobile interior space has also remained almost constant since 1978, as shown in Figure 9.

5.2 Efficient cars can be safe cars

Points in Figure 10 represent the weight and safety performance of 1984 to 1988 model year cars crash tested by the U.S. Department of Transportation's National Highway Traffic Safety Administration. These cars were crashed into a fixed barrier at 35 mph. The measure of safety performance is the driver head injury criterion (HIC), which reflects the potential for injury to a driver's brain. The higher the number, the higher the potential for injury. As shown here, there is no relationship between automobile weight and head injury criteria. In fact, there are some heavy vehicles that perform poorly (upper right portion of the figure) and some light vehicles that perform very well (lower left portion of the figure). A plot of the passenger side HIC yields very similar results.

Crashing a car into a fixed barrier does not necessarily measure how weight affects a car's performance in a crash. Nonetheless, Figure 10 illustrates that there are large differences in the crash worthiness of automobiles, independent of weight. A 1982 study pointed out that the differences in crash performance within weight classes were greater than the differences among weight classes.[13] Many existing light-weight cars perform well in crash tests, yet much safer and more fuel-efficient cars are still possible. The Volvo LCP 2000 prototype was designed with both safety and fuel economy in mind. The car weighs 1500 pounds (less than half today's average new auto weight of about 3200 pounds), achieves 63 mpg in the city and 81 on the highway.[14] This car can withstand frontal and side impacts of 35 mph, and a rear impact of 30 mph, thereby meeting and exceeding current U.S. safety regulations.

Evidence that fuel economy and automobile safety can be improved simultaneously is also found in the statistical record established in the United States. Since 1973, the average fuel economy for all cars on the road rose from 13 mpg to 20 mpg. During the same period, traffic fatalities fell from 3.5 per 100 million vehicle miles traveled to 2.4. Safer cars and highways, increased use of seatbelts, and anti-drunk driving campaigns are widely recognized as major reasons for the improvement.

5.3 Do not be mislead by unsound studies

Despite the overwhelming evidence that improving fuel economy and automobile safety are compatible goals, opponents of CAFE cite studies of crash data that purport to demonstrate a relationships between car size or weight and fatalities. A problem with all such studies based on actual accident data the difficulty of separating the effects of driver behavior from vehicle characteristics when estimating the propensity of certain cars to be involved in fatal accidents. For example, the bad fatality record of a few high-performance sports cars may lead one to conclude that these cars are inherently unsafe. But dangerous driving practices of persons who commonly own these cars may be responsible for their bad safety record. Similarly, the worse-than-average safety record of a few small, inexpensive, and fuel-efficient cars may be due to the atypical driving behavior of people who tend to buy these cars, e.g., drivers of small cars tend to be young.

In addition to the distortion caused by driver characteristics, differences in automobile uses can distort the results of such studies. For example, consider a recent report by the Insurance Institute for Highway Safety (IIHS) which purports to demonstrate that downsizing (wheelbase reduction) results in less safe cars.[15] Their analysis is summarized in a table entitled, "Deaths per 10,000 registered cars, GM models before and after downsizing, 1985-89." Unfortunately, the table compares apples and oranges and produces misleading results. The table compares pre-downsized GM cars with downsized versions of the same car. The report concludes that the downsized cars are much less safe than their pre-downsized versions. Had the data been adjusted for differences in car uses, the analysis may have yielded substantially different results.

To illustrate the importance of such adjustments, we adjusted the data in the table for just one of factors that should be considered in a thorough analysis. As shown here in Table 2, an adjustment is made for the difference in how many miles cars are driven each year. This type of correction is made to demonstrate the importance of accounting for the degree of exposure to accidents. Because particular data on the annual miles for each of these cars are not available, statistics on the average annual miles driven by car age were used based on survey data of the U.S. Department of Transportation. Once the data in the table are adjusted for the fact that older cars are driven fewer miles, and therefore are less exposed to accidents, the results change dramatically. As can be seen in the enclosed table, seven of the eleven cars had lower death rates after they were downsized.

The point of this exercise is not that the results of our adjustment make for a more conclusive study. Rather, it shows the total lack of robustness in the results presented by the IIHS. The example adjustment is not the only one that should be considered--many others must be made to produce a fair comparison. Moreover, the analysis (and a follow-up rebuttal to our critique[16]) investigates only a small subset of cars on the road, and it looks at only a one aspect of the safety issue. It is irresponsible to use the results of such flawed and incomplete studies to guide public policy.

In summary, it is certain that with careful design, cars can be both fuel efficient and safe. Current and future technologies provide a broad range of opportunities for substantially and simultaneously improving both fuel economy and safety. While the results of some studies may justify a closer look at the effect of car size and weight on crash performance, research into the issue must be much more thorough and methodologically sound than the simplistic and misleading approaches recently put forward by some opponents of CAFE. The experience of the past 15 years as well as the technological opportunities now available clearly demonstrate that efficiency and safety can be simultaneously improved. Therefore, safety concerns provide no reason to hesitate in immediately adopting increased CAFE standards and other policies to promote light vehicle fuel economy. If public officials feel that new cars are not safe enough, then tougher safety standards should be adopted as well.

6. IMPROVED FUEL ECONOMY IS NECESSARY TO ADDRESS GLOBAL WARMING

In addition to improving the U.S. balance of trade and energy security, future light vehicle fuel economy increases could reduce the threat of global warming by reducing emissions of carbon dioxide (CO_2). Past improvements in light vehicle fuel economy have already had a significant effect on U.S. carbon dioxide emissions. Had the improvement in light vehicle fuel economy between 1976 and 1989 not occurred, carbon emissions would be 120 million metric tons higher (about 9% of current total U.S. carbon emissions). Improving light vehicle fuel economy to the CAFE-40 levels would reduce carbon emissions by another 120 million metric tons by the year 2005.

Light vehicles are the single largest end user of fossil fuels in the United States. They are responsible for about 270 million metric tons of carbon emissions per year, more than total carbon emissions from fossil fuels in all of Africa. The effect of future fuel economy improvements on global warming will of course depend on the degree of those improvements. The recent OTA report[17] on greenhouse gas reduction concludes that among the dozens of measures considered, improvements in light vehicle fuel economy hold one of the greatest potentials for reducing CO_2 emissions by the year 2015.

In a recent report, the Environmental Protection Agency (EPA) examined the effect on global warming of substantial fuel economy increases in the U.S. and world automobile fleets.[18] EPA estimates that increasing the world's fleet fuel economy to 50 mpg by the year 2025 would reduce projected global warming by 5% in a future scenario that assumes rapid technological change and economic growth. For perspective, EPA estimates that the 5% reduction is larger than the reduction in global warming that could be achieved through a near complete phaseout of CFCs by 2003, or through a rapid development of low-cost solar technology, as illustrated in Figure 6.

Improving U.S. light vehicle fuel economy is not, of course, the complete solution to the global warming problem. However, among the many efforts we must undertake to slow the rate of global warming, it is one of the most important and most feasible. Higher CAFE levels will not only benefit the United States directly, but given the great influence U.S. fuel economy policies and technologies could have on other countries, automobile fuel economy levels in other countries would likely rise also. Thus amplified, U.S. reductions in oil consumption could greatly reduce the likelihood and magnitude of any oil supply disruption or price rise, as well as reduce CO_2 emissions.

7. CONCLUSION

Federal fuel economy policies made a major contribution toward the fuel economy improvements achieved since 1975. But because they require no further improvements, and because real gasoline prices have fallen for years, the long upward trend in fuel economy has stalled. This cessation in fuel economy improvement puts our nation's economy, security, and environment at risk. Among the options for reducing our dependence on oil imports within the next ten to twenty years, none will have greater effect than substantially improving light vehicle fuel economy. Furthermore, because large energy efficiency improvements in all sectors or our economy will be necessary to slow projected climate changes that threaten life on this planet, and because light vehicles are the single largest end user of fossil fuels, we must begin again the task of improving vehicle fuel economy. The market can be of assistance in pushing fuel economy levels higher, but it will not be sufficient. Now is the time for action on this critical issue. ACEEE urges congress to respond by passing legislation to mandate at least a 40% improvement in light vehicle CAFE levels over the next ten years.

NOTES

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Table 2
A COMPARISON OF ADJUSTED AND UNADJUSTED DATA

DEATHS PER 10,000 REGISTERED CARS, GM MODELS BEFORE AND AFTER DOWNSIZING, 1985-89

				IIHS RESULTS				ADJUSTED RESULTS
	Model Yr. Down-sized	Death Rate Before Downsizing	Death Rate After Downsizing	Percent Change In Rate	Avg. Annual Miles, Pre-Downsized Cars	Avg. Annual Miles, Down-sized Cars	Adjustment Factor	Adjusted Percent Change in Rate
					(1)	(1)	(2)	
1. B Car	1977	1.2	1.4	+17	4150	5350	.77	-8
2. C/D Car	1977	1.1	1.2	+9	4150	5350	.77	-18
3. A/G Car	1978	1.7	1.8	+6	4750	6000	.79	-18
4. E Car	1979	0.9	1.1	+22	5350	6600	.81	0
5. X Car	1980	1.9	2.2	+16	6000	6900	.87	0
6. A Car	1982	1.5	1.5	0	6900	8400	.82	-20
7. F Car	1982	2.3	3.3	+43	6900	8400	.82	+17
8. Y Car	1984	3.9	4.4	+13	7500	9400	.80	-10
9. C/D Car	1985	1.0	1.3	+30	9050	10450	.87	+10
10. B/H Car	1986	1.1	1.4	+27	9650	11200	.86	+9
11. E Car	1986	0.9	1.5	+67	9650	11200	.86	+44

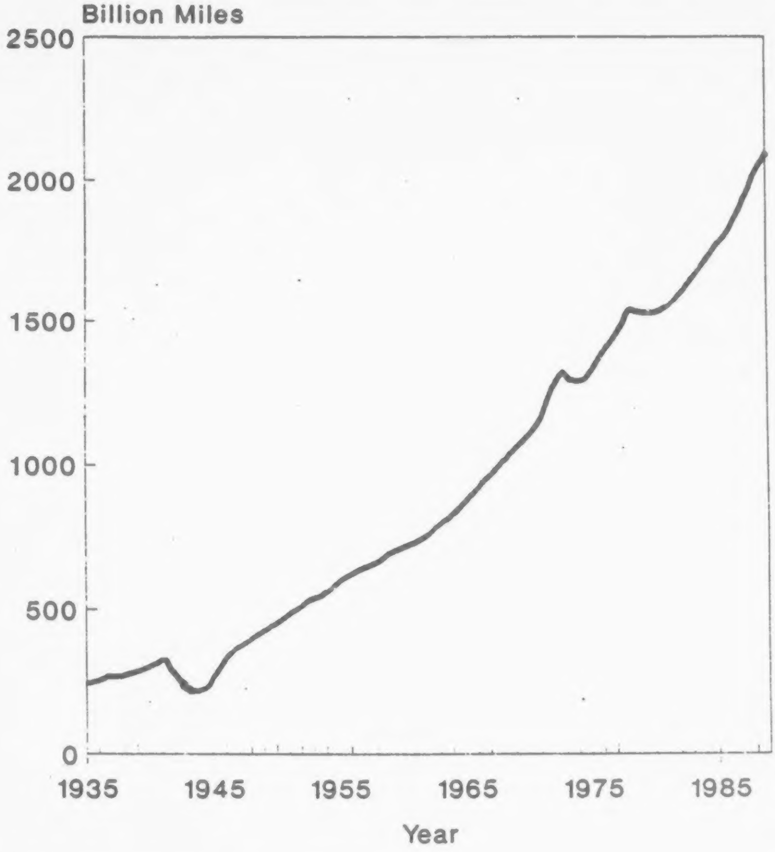
NOTES:

1. Each car type compared in the table includes a mix of model years. For example, the B Cars include 1975 and 1976 model year cars in calculating the death rate before downsizing, and 1977 and 1978 model year cars in the calculations for the death rate after downsizing. Since the relative proportions of the different model years is not known, the above estimates of annual miles driven for each car assume that half of the pre-downsized B cars are 1977 models, and half are 1978 models. All estimates of average annual miles driven, for each car type are calculated similarly.

2. The adjustment factor is the ratio of "Avg. Annual Miles, Pre-Downsized Cars" over "Avg. Annual Miles, Post-Downsized Cars." The factor adjusts for the higher accident exposure in newer (downsized) cars relative to older (pre-downsized) cars. The newer cars have higher accident exposure because, on average, they are driven more miles per year than the older cars they replace. The factor is multiplied by the values in the column labeled, "Death Rate After Downsizing," to produce an adjusted death rate after downsizing. This adjusted death rate is then compared with the death rate before downsizing to produce the "Adjusted Percent Change in Rate" in the last column.

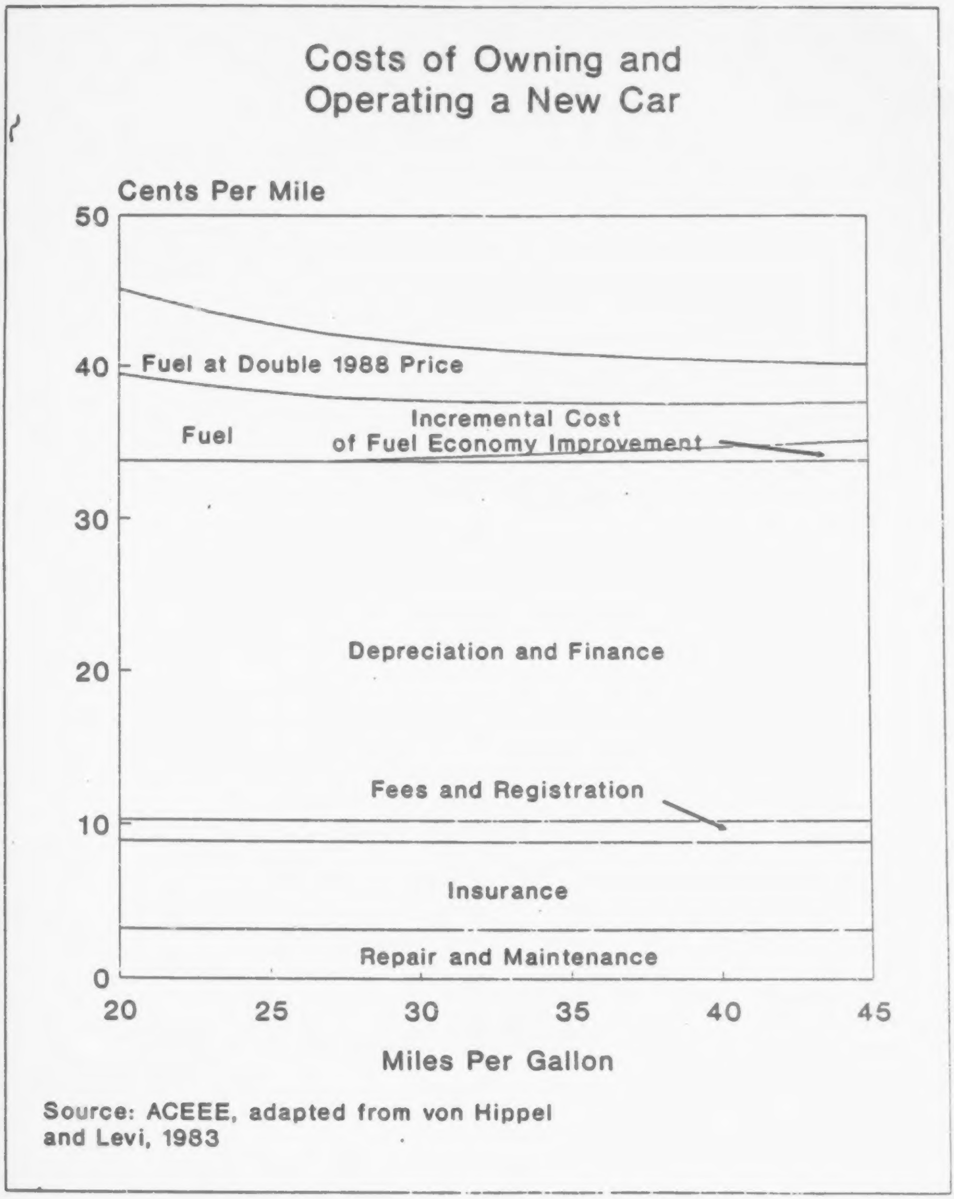
Figure 1

U.S. Annual Vehicle Miles Traveled
1936 - 1989
(All Road Vehicles)



Source: Federal Highway Administration

Figure 2

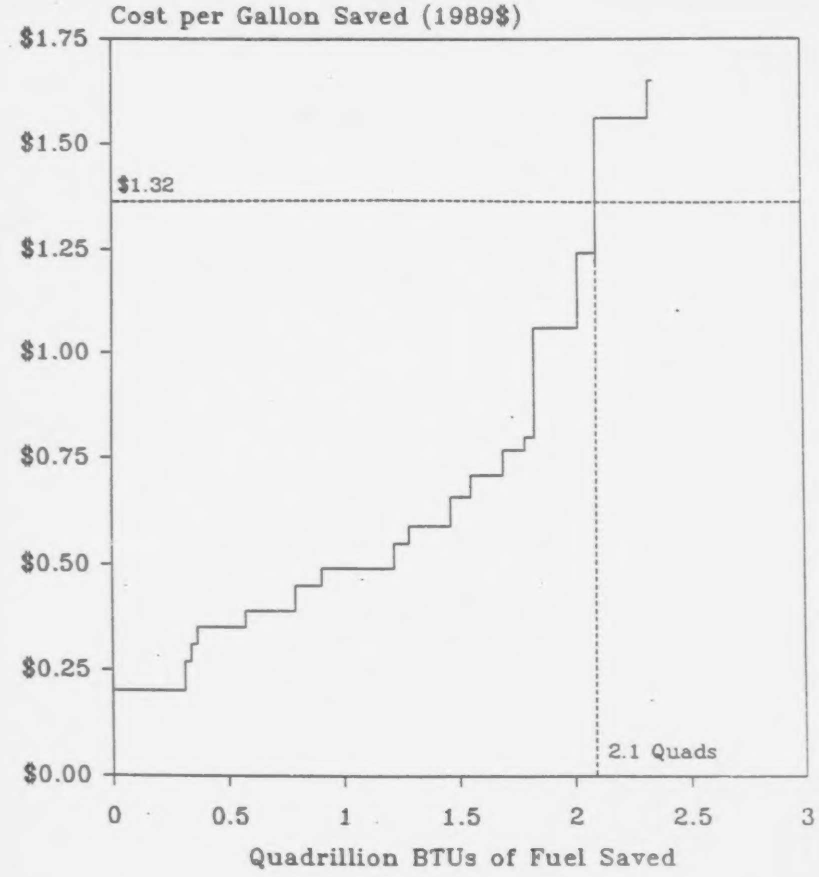


Source: ACEEE, adapted from von Hippel and Levi, 1983

Figure 3

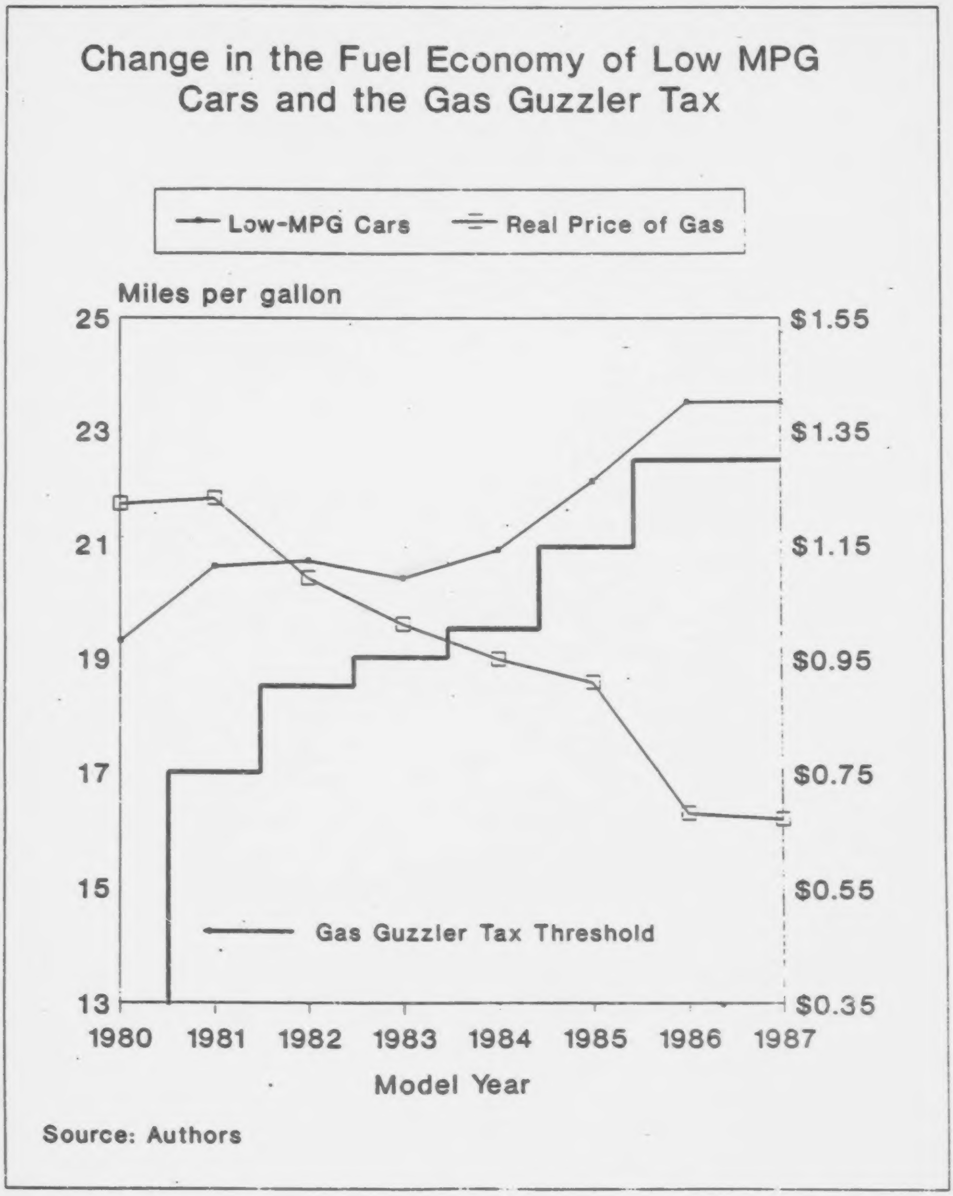
Conservation Supply Curve
Auto Fuel Efficiency, Year 2000

Technology Group 2



Assumes 7% Discount Rate

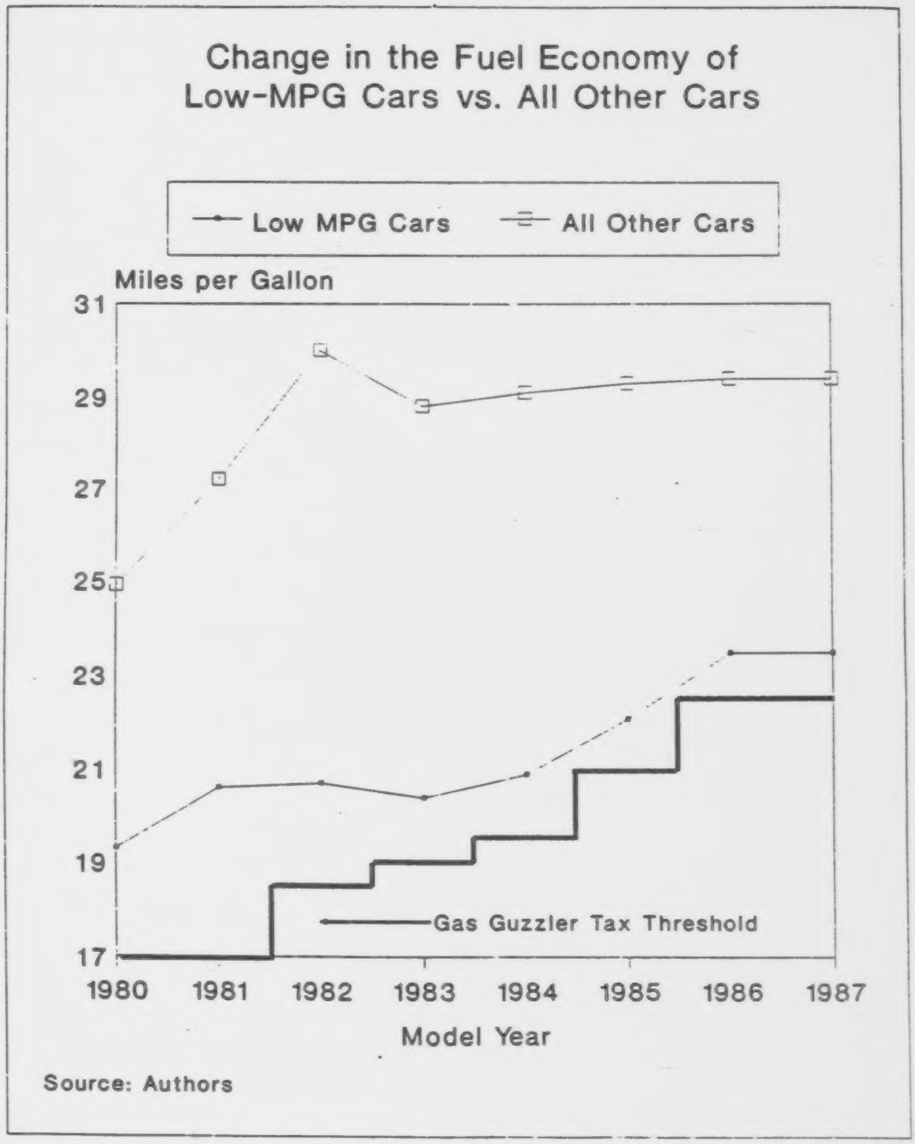
Figure 4



Change in the Fuel Economy of Low MPG Cars and the Gas Guzzler Tax

Source: Authors

Figure 5



Source: Authors

Figure 6

Many Individual Measures, Each Having A Modest Impact on Greenhouse Gas Emissions, Can Have a Dramatic Impact on the Rate of Climatic Change When Combined

Relative Effectiveness of Different Policy Strategies

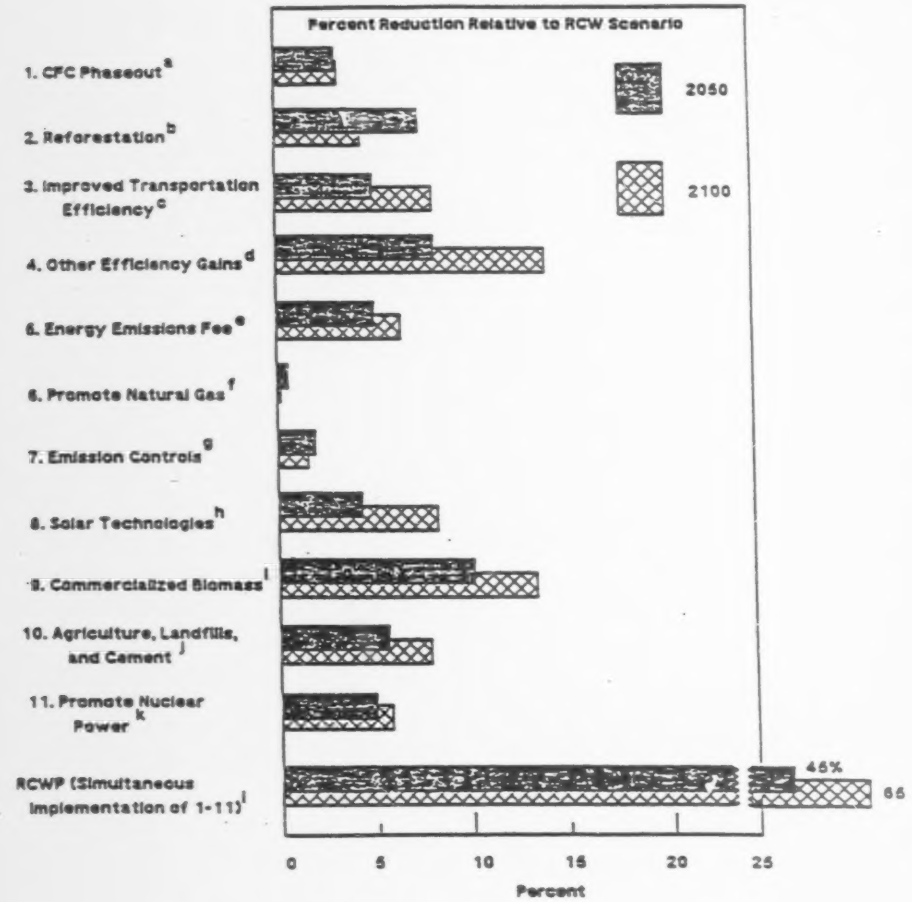
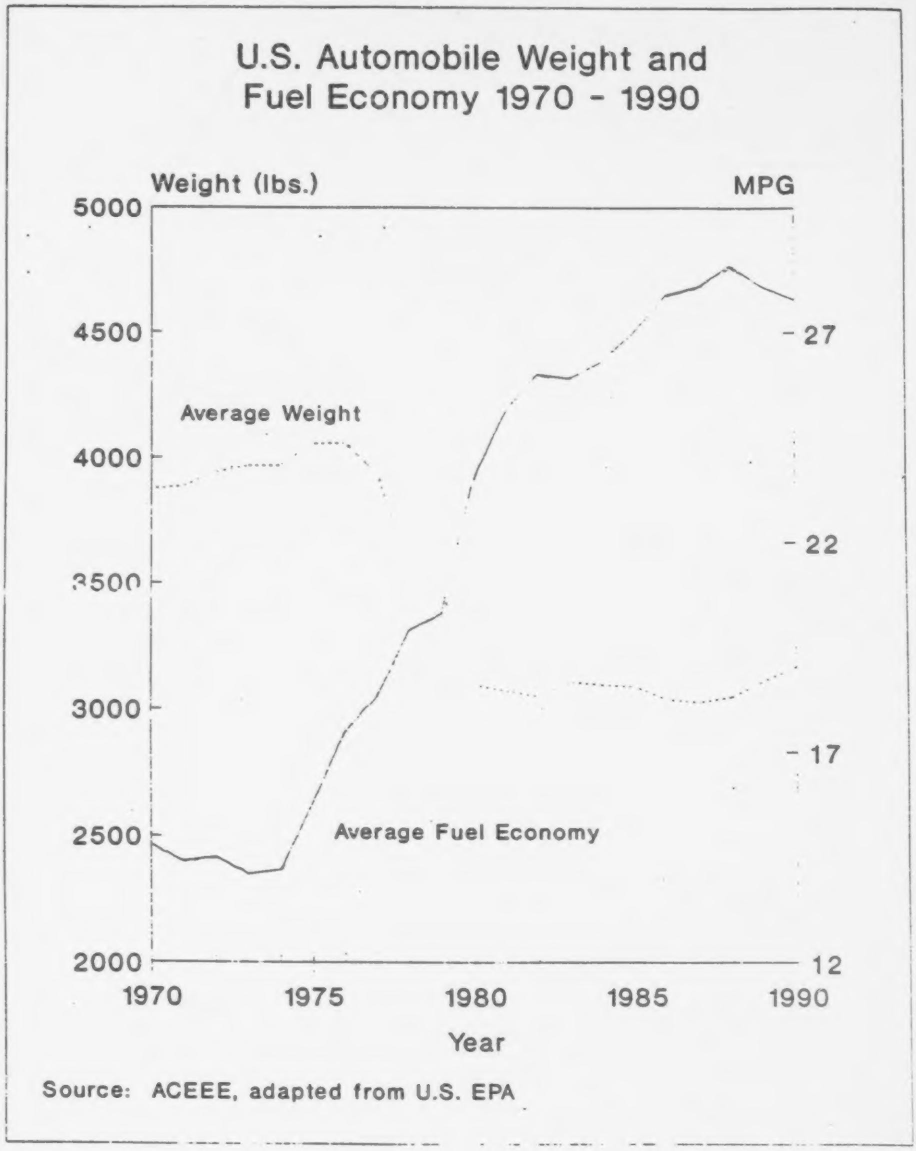


Figure 7



Source: ACEEE, adapted from U.S. EPA

Figure 8

Divisia Decomposition of Fuel Economy Changes in New Automobiles, 1976-1988

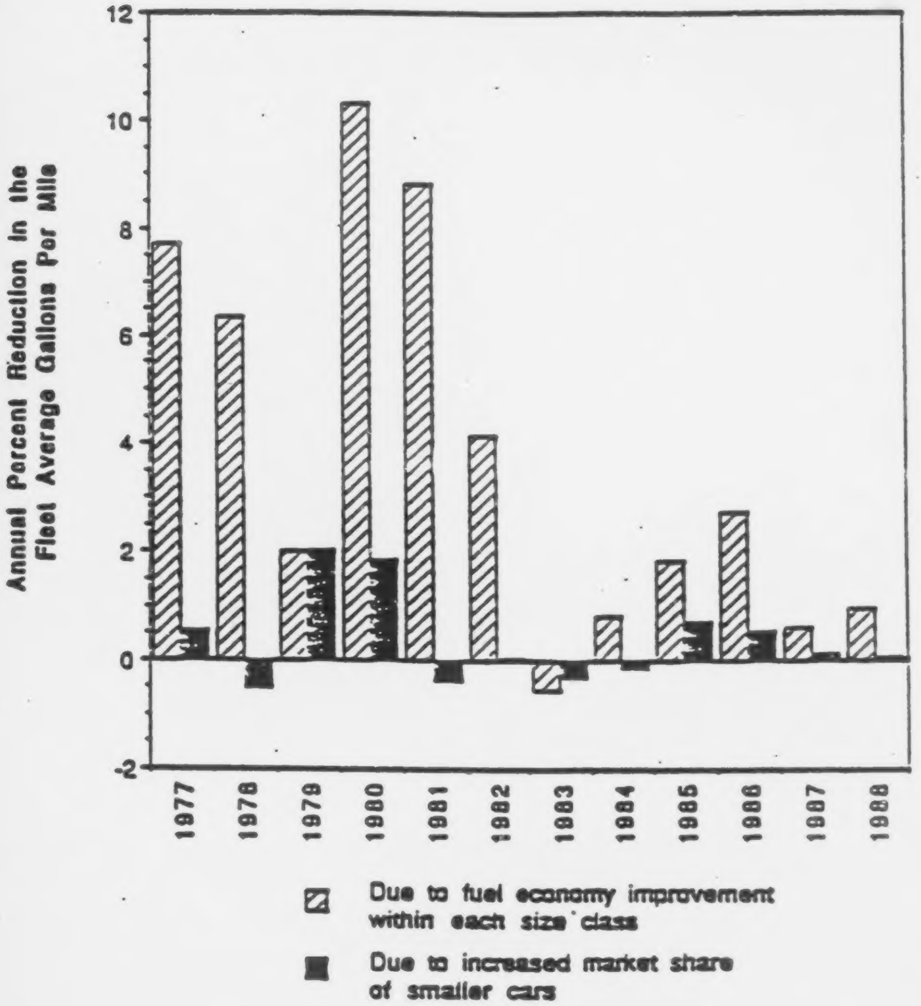
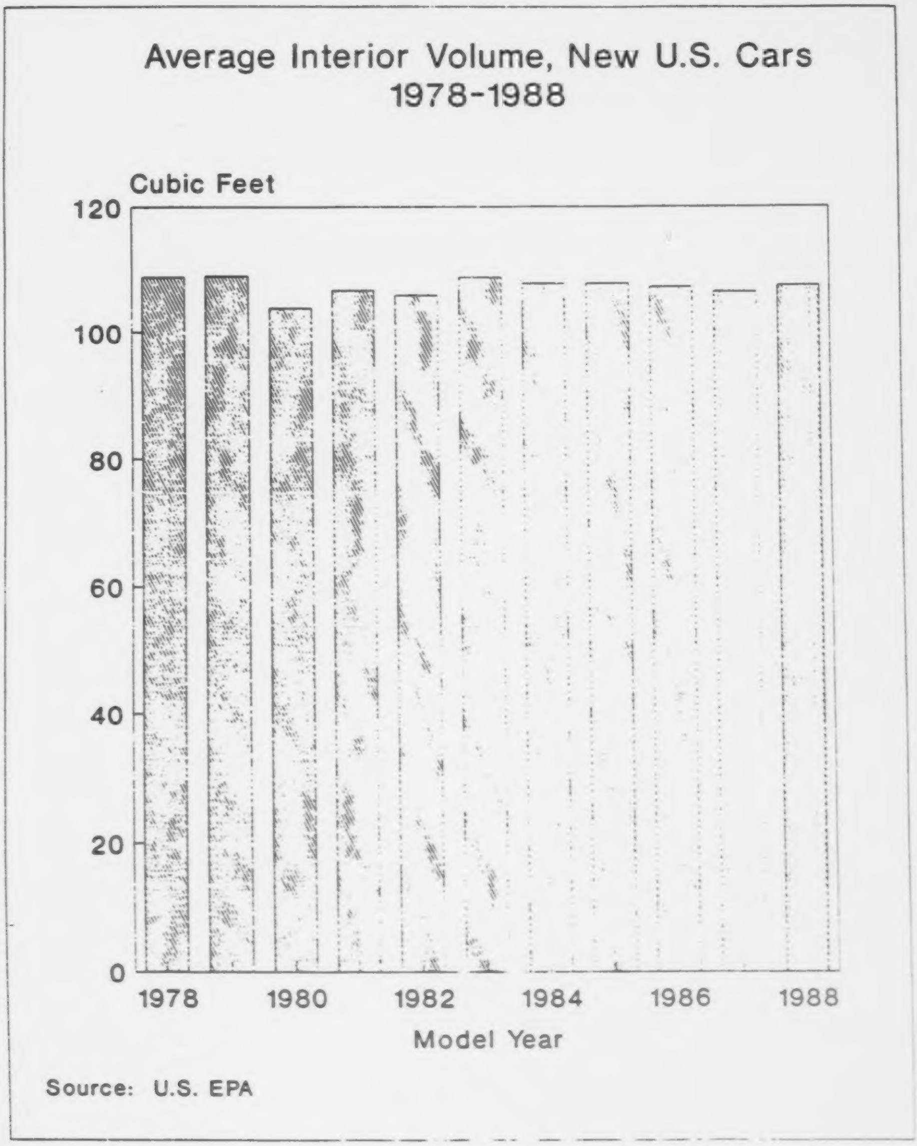


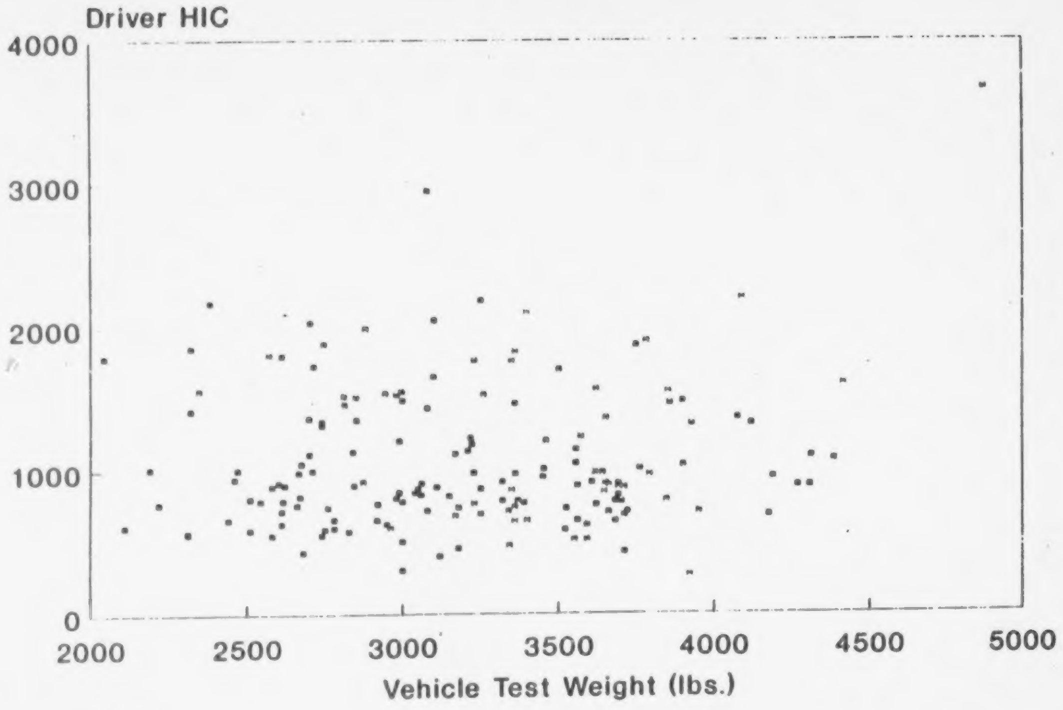
Figure 9



Source: U.S. EPA

Figure 10

Auto Weight vs. Driver
Head Injury Criterion



Source: ACEEE

SAVINGS FROM CAFE
Projections of the future oil savings from light vehicle fuel economy legislation

John M. DeCicco
American Council for an Energy-Efficient Economy

DRAFT -- February 12, 1991

A number of proposals for increasing the energy-efficiency of the light vehicle fleet are being considered by the 102nd Congress. The legislation would set new targets for the corporate average fuel economy (CAFE) levels to be met by manufacturers selling cars and light trucks in the United States. This paper summarizes the legislation currently proposed and provides estimates of the savings in petroleum fuel consumption that will occur as the standards are met and as newer, more efficient vehicles subsequently replace older ones in the light vehicle stock. These savings projections are summarized in Table 1.

Table 1. Projected oil savings from 1991 proposed CAFE standards

Proposal:	Millions of barrels per day (Mbd) Savings in 2001	 Savings in 2005	 Savings in 2010	Billions of barrels cumulative by 2010
S. 279 (Bryan), H.R. 560 (Panetta) 20% improvement by 1996 and 40% improvement by 2001	1.6 Mbd	2.5 Mbd	3.2 Mbd	11 Bbbl
H.R. 446 (Boxer) 20% improvement by 1996 and 60% improvement by 2001	1.9 Mbd	3.1 Mbd	4.1 Mbd	13 Bbbl

By way of comparison, the total motor gasoline consumption rate in the U.S. was 7.4 million barrels per day (Mbd) during 1990,[1] of which about 6.4 Mbd was consumed in light vehicles covered by CAFE standards.[2] Overall U.S. consumption of petroleum products is 17.4 Mbd, of which 44% percent is imported oil.[3] Barring external events with a major long term impact on the petroleum supply or demand, the import share will grow to over 60% by 2010 unless we have effective policies, such as improved fuel economy standards, which hold down the need for oil.

The proposed increases would occur in two steps, reaching a first level of improvement by 1996 and a second level by 2001. We provide estimates for (1) the initial savings in 10 years (year 2001), as the second level is met; (2) the savings in 15 years (year 2005), after the efficient cars have significantly penetrated the country's light vehicle stock; and (3) the annual and cumulative savings in 20 years (to year 2010), which covers most of the expected lifetime of the first set of vehicles falling under the full standards. We do not assume increases in standards after 2001, although further increases in CAFE are likely to be feasible as the technology continues to advance.

The legislation proposing a 40% improvement by 2001 is S. 279, introduced by Sen. Richard Bryan; a similar proposal is part of H.R. 560, introduced by Rep. Leon Panetta. H.R. 446, introduced by Rep. Barbara Boxer, proposes a 60% improvement by 2001. The estimates given here are based on the requirements set forth in S. 279 for a 40% increase and in H.R. 446 for a 60% increase (the details are discussed below). The base model year for improvements is 1988, for which the average CAFE levels were 28.6 mpg for cars and 21.2 mpg for light trucks.[4]

Savings are estimated relative to a "frozen efficiency" situation, in which the fuel economy of the U.S. vehicle fleet remains fixed at current levels (based on averages for the 1990 model year). Under such an assumption, the light vehicle fuel demand would rise to 8.6 Mbd in 2001 and 10.7 Mbd in 2010.[5] This reference case is neutral to the impact of possible future price changes or fears of oil shortages. If such concerns were to arise, the market might move toward greater fuel economy even in the absence of new standards. However, the previous two years have revealed an opposite trend, towards less efficient cars. Rather than attempt to predict what might occur under a *laissez-faire* policy, we hold fuel economy fixed as the basis of comparison for our savings estimates. Indeed, the greater certainty with which fuel supply requirements can be predicted when vehicles meet mandated efficiency levels is seen by some as a benefit of such standards, apart from the direct benefits of petroleum savings.

In addition to the oil savings, environmental benefits of improved CAFE levels will include reduced greenhouse gas emissions. Table 2 shows the projected annual reductions in CO_2 emissions which correspond to the oil savings. Compared to what light vehicle CO_2 emissions would otherwise be in 2010, these estimates represent a 30% reduction for S. 279 and a 39% reduction for H.R. 446. (The Department of Energy projects that total U.S. CO_2 emissions from all fossil fuel consumption will reach about 7900 million tons per year by 2010.) An additional environmental benefit of increased CAFE will be air quality improvements due to reduced emissions of hydrocarbons; since the overall level of motor fuels supplied in the country will decrease, there will be decreases in the hydrocarbon emissions associated with the production, refining, and transportation of the fuel.

Table 2. Projected reductions in carbon dioxide emissions resulting from new CAFE standards as proposed in 1991

	Annual greenhouse emissions reductions Millions of tons (Mt) of CO_2		
Proposal:	in 2001	in 2005	in 2010
For 40% increase (S. 279, H.R. 560)	300 Mt	470 Mt	600 Mt
For 60% increase (H.R. 446)	360 Mt	580 Mt	770 Mt

SUMMARY OF CAFE PROPOSALS

The key provisions of the proposed CAFE legislation are summarized here. In the projections given here, it is assumed that CAFEs remain frozen after 2001. Additional assumptions used in making the estimates of fuel savings are listed in a later section of this paper.

S. 279: Each manufacturer increases its CAFE over its 1988 base by 20% by 1996 and by 40% by 2001, subject to certain ceilings. The ceilings are maximum fuel economy levels, above which no manufacturer is required to go, as follows: for passenger cars, 40 mpg in 1996 and 45 mpg in 2001; for light trucks, 30 mpg in 1996 and 35 mpg in 2001.

H.R. 446: Each manufacturer increases its CAFE over its 1988 base by 20% by 1996 and by 60% by 2001, subject to certain ceilings. The ceilings are maximum fuel economy levels, above which no manufacturer is required to go, as follows: for passenger cars, 45 mpg in 1996 and 50 mpg in 2001; for light trucks, 35 mpg in 1996 and 40 mpg in 2001.

EFFECTS OF ROLLBACKS AND CEILINGS

There are provisions in the proposed legislation for modifications of the standards, based on a rulemaking proceeding by the Secretary of Transportation. Such "rollbacks" happened during the course of the present CAFE standards. If the Senate bill standards are rolled back so that only a 30% improvement in fuel economy is achieved by 2001, there would be a 14% reduction in the annual savings, from 2.5 million barrels per day (Mbd) down to 2.2 Mbd. If the higher House bill standards are dropped from a 60% to a 50% improvement by 2001, the savings would be reduced by about 8%, from 3.1 Mbd down to 2.9 Mbd.

As noted earlier, there are "ceilings" (caps) in the CAFE targets, that is, specific fuel economy (mpg) values which give the maximum fleet efficiency a manufacturer is required to reach by the target years. Averaged over all manufacturers, the effect of the ceilings is small, resulting in a less than 3% reduction in the savings from what it would be without the ceilings. The bills also specify "floor," minimum fuel economy levels that must be met even if the manufacturer is starting from a low base. These would currently affect only a few, low-volume fleets, so that there effect would be quite small; such floors were not considered in the projections.

ASSUMPTIONS USED IN MAKING THE PROJECTIONS

(a) The base year is taken as 1988, using final CAFE data by manufacturer provided by the Office of Market Incentives, Federal Highway Administration, and for which the overall new vehicle fuel economies averaged 28.6 mpg for passenger cars and 21.6 mpg for light trucks.

(b) In responding to the new law, manufacturers make no increases in CAFE until model year 1994, at which point CAFEs start increasing toward the new targets for 20% improvement by 1996. Through 1993, overall new vehicle CAFEs are held at their 1990 values of 27.8 mpg for passenger cars and 21.0 mpg for light trucks.

(c) Without new standards, new vehicle CAFE levels remain frozen at their 1990 values. Oil savings are computed as the difference between consumption at the frozen CAFE levels and consumption at the levels used to meet the new standards.

(d) Vehicle miles travelled (VMT) is estimated starting with the 1988 and preliminary 1990 VMT data from FHWA,[6] using annual growth rates of 2.5% through year 2000 and 1.5% from 2000-2005. The portion of VMT attributed to light trucks is assumed to increase from 24% in 1990 to 33% for 2000 and thereafter.

(e) The mix of light vehicles on the road remains fixed over the projection years with respect to age, miles driven by age, and market share by manufacturer.

(f) Because of increasing congestion, urbanization, higher road speeds, and other factors, actual on-road fuel economy is less than the EPA-rated fuel economy. The correction factor for this difference is assumed to grow linearly from 15% in 1986 to 30% in 2010.[7] The estimated value in 2005 is 27% (meaning that actual on-road CAFE is taken as 73% of the target EPA-rated value).

(g) In attempting to meet their new standards, manufacturers exceed their CAFE targets with a safety margin of 0.7 mpg for passenger cars and 0.2 mpg for light trucks. The effect of this safety margin is small; if target standards were reached exactly, there would only be a 3% reduction in savings.

(h) Each savings of 1 million barrels per day in petroleum end-use results in a carbon dioxide emissions reduction of 190 million tons per year, which includes accounting for upstream emissions during the production and transportation of petroleum products.[8]

CERTAINTY LEVEL OF THE PROJECTIONS

Any projections such as these involve some uncertainty, since we cannot exactly project what will happen in the future. The principle uncertainty has to do with the amount future light vehicle travel in the United States. Travel in automobiles and light trucks is measured by the statistic known as "vehicle miles travelled" (VMT), which depends on demographic factors, economic activity, as well as changes in transportation policy. VMT becomes less certain farther into the future; we estimate that ten years out, our projection of VMT has an uncertainty of ±9%, growing to ±13% by 20 years out.

An additional quantifiable uncertainty is introduced by the assumption that manufacturers will meet the CAFE standards with some safety margin, i.e., that the fleet averages will actually be a little higher than what is actually mandated by the standards. As noted earlier, the effect of these margins is small, introducing at most an additional 3% error into our projections.

Other sources of uncertainty involve the rates of vehicle stock turnover, the annual miles driven by vehicles of different ages, the relative market shares of light trucks versus passenger cars as well as among various size classes, and the reduction in actual on-the-road fuel economy over the EPA test levels due to congestion and other factors. The levels of uncertainty among these factors are difficult to quantify; there may be relationships among the various factors and some effects may balance out.

In summary, we estimate an uncertainty of about ±20% for the 2005 projections. Regarding the S. 279 projection of 2.5 Mbd oil savings in year 2005, for example, we are therefore confident that the actual savings will be between 2 Mbd and 3 Mbd. For policy makers, this should be a reassuring level of certainty that improving CAFE standards will indeed work to address the problems such as imported oil dependence and environmental impacts posed by petroleum use in motor vehicles.

NOTES

1. EIA (Energy Information Administration), Annual Energy Outlook 1990, with projections to 2010. Report DOE/EIA-0383(90), January 1990; estimates for 1990 and projections for 2010 use EIA's base case forecast.
2. Apportionning the total motor gasoline consumption by the shares for automobiles and 90% of light trucks, as reported in Davis, S.C. *et al.*, Transportation energy data book: edition 10, report ORNL-6565, Oak Ridge National Laboratory, Oak Ridge, TN, September 1989.
3. EIA, Annual Energy Outlook 1990 (*op. cit.*).
4. Using sales-weighted averages based on 55% city, 45% highway average EPA test data as reported in Table 1 of Heavenrich, R.M., and J.D. Murrell, Light-duty automotive technology and fuel economy trends through 1990, U.S. Environmental Protection Agency report EPA/AA/CTAB-90-3, Ann Arbor, MI, June 1990.
5. ACEEE projections based on VMT growth, increasing light truck shares, and erosion of on-road fuel economy; see the "Assumptions" section of this paper for details.
6. FHWA, Traffic Volume Trends Tables (2 Jan 91), pers. comm. from K.H. Welty, Traffic Monitoring Division, Office of Highway Information Management.
7. Westbrook, F., and P. Patterson, Changing driving patterns and their effect on fuel economy, presented at the 1989 SAE government/industry meeting, May 1989.
8. MacDonald, G. The long-term impacts of increasing atmospheric carbon dioxide levels, Ballinger, Cambridge, MA, 1982; using values for direct combustion plus production and transportation of oil fuels, cited in Table 6 of MacDonald, G. Annual Review of Energy 15:53-83, 1990.

American Council for an
Energy-Efficient Economy

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TECHNICAL MEMORANDUM 19 March 1991

By: John DeCicco

Re: Sensitivity analysis of oil savings projected for new CAFE standards.

This memorandum discusses the effect of various assumptions on the projected oil savings that would occur if strengthed Corporate Average Fuel Economy (CAFE) standards are implemented for automobiles and light trucks in the United States. The analysis is done for the level of standards proposed in S. 279 of the 102nd Congress, which proposes increases in CAFE by manufacturer of 20% by 1996 and 40% by 2001, relative to a base year of 1988, along with other provisions and qualifications. In a brief paper entitled "Savings from CAFE" (12 February 1991), ACEEE provided an estimate of 2.5 Mbd (millions of barrels per day) in 2005 for the oil savings from S. 279. This estimate is for unadulterated standards, that is, assuming that the standards are implemented according to their full intent, without rollbacks or amendments that might weaken their effect, and assuming that in the absence of the proposed standards there are no increases in fuel economy above the current levels, i.e., frozen efficiency.

Part 1 of this memorandum summarizes the effects of amendments, rollbacks, and complementary policies which can impact CAFE. Part 2 gives a comparison with the CAFE savings estimates claimed by the Department of Energy.

1 EFFECTS OF POLICY CHOICES AND OTHER FACTORS

Various policy choices and other factors which can affect the achieved CAFE levels are discussed here. Each factor is first examined in isolation; a summary table is then given which illustrate the combined effects of the factors analyzed.

1.1 Administrative discretion

Under the provisions of S. 279 for "Modifications of Standards," in response to petition or of its own initiative, the Department of Transportation may conduct a rulemaking proceeding in order to determine a maximum feasible average fuel economy for the years covered by the standard. Reductions in standards specified as the outcome of such a proceeding are known as "rollbacks," such as happened during the course of the present CAFE standards. S. 279 limits the CAFE rollbacks to not less than a 15% improvement in 1996 and not less than a 30% improvement in 2001, relative to the 1988 base year. If the standards are rolled back to the maximum extent and the reduced standards are exactly met, the new car CAFE would reach 37 mpg in 2001. In 2005, there would be a 20% reduction the annual savings, from 2.5 Mbd down to 2.0 Mbd.

The guidelines of S. 279 also allow that the outcome of a rulemaking proceeding might increase the standard above the nominal levels of 20% in 1996 and 40% in 2001. Although no upper bound is placed on the maximum standard level, raising the standard to a 60% increase by 2001 provides a useful scenario for comparison.[1] In this case, the new car CAFE would reach 45 mpg and the oil savings would be 3.1 Mbd in 2005, a 24% increase in savings over the nominal S. 279 level.

1.2 Flexible fuels credit

The Alternative Fuels Act of 1990 provides a CAFE credit for manufacturers who include vehicle capable of running on certain alternative fuels (such as methanol or ethanol blends). The credit is currently limited to 1.2 mpg for a corporate fleet. This credit takes effect whether or not any alternative fuels are actually used in the flexible fuel vehicles. Assuming that all manufacturers can take full advantage of this credit from 1996 onward, the average new car CAFE would be 39 mpg (rather than 40 mpg without the credit). Oil savings in 2005 would be 2.2 Mbd, a 12% reduction from level without flexible fuels credit, unless significant quantities of alternative fuels are actually used. If the current cap on the flexible fuels credit is raised, as proposed in S. 341 and the administration's National Energy Strategy, the savings from CAFE will erode even further.

A flexible fuel credit without a provision for validating that alternative fuels are actually used in the vehicles is a poor idea, because it reduces overall fleet fuel economy without insuring any oil displacement. Furthermore, a flexible fuel CAFE credit is counterproductive to ultimate goals of introducing alternative fuels, because the success of alternative fuel vehicles will be partly dependent on their efficiency, and many of the efficiency technologies that apply to gasoline or diesel powered vehicles will also apply to alternatively fueled vehicles.

1.3 Truth in testing

There is a significant and growing discrepancy between the rated fuel economies of light vehicles and the fuel economies actually experienced by consumers. The discrepancy (gap) between the two was estimated to be about 15% in 1986 and is projected to reach 30% by 2010.[2] The gap is caused primarily by congestion, as well as an increasing share of urban driving and higher highway speeds. Presently the gap is about 20%, which means that even though the 1990 new car fleet has an average EPA rating of nearly 28 mpg, the on-the-road fuel economy of the new cars is actually closer to 23 mpg. Closing the gap by requiring that a new test procedure be developed and phased in, so that the rated fuel economy matches the on-road performance, would yield significant increases in oil savings. A truth-in-testing phase-in aimed to completely close the gap by 2010 would, in combination with a 40% increase in rated fuel economy by 2001, yield savings of 4.1 Mbd in 2005, a 64% increase over the savings from CAFE-40 alone.

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[1] A 60% improvement by 2001 is proposed by H.R. 446. That such a level might be feasible is supported by the "technology group 2" analysis of Ross and Ledbetter (1990).

[2] Westbrook, F., and P. Patterson. Changing driving patterns and their effect on fuel economy. Presented at the 1989 SAE Government/Industry Meeting, Washington, DC, May 1989.

1.4 Gas-guzzler/gas-sipper fee/rebates

Extentions of the present gas guzzler tax to a gas-guzzler/gas-sipper fee/rebate incentive system are being discussed as a policy complement to CAFE. Such incentives to influence car buyers preference for fuel economy can be a useful in lowering the risk to manufacturers who are concerned consumer demand for their more efficient models. A practical fuel economy-related fee/rebate system is likely to have a small effect relative to a 40% CAFE improvement, so it must be viewed as a complement to CAFE, not a replacement. Various proposals, some modeled after the DRIVE$^+$ program developed in California, have been put forward. We have not done a full analysis of the fuel savings impact of such a fee/rebate system, but have made rough calculations to estimate the magnitude of the effect. Assuming that such a system results in a 5% improvement in achieved CAFE levels by 2001 rising to 10% by 2010, the additional savings in 2005 would be 0.34 Mbd, or a 13% improvement over the savings from CAFE alone.

1.5 Timing of savings

Because the average lifetime of automobiles is about 11 years (that of light trucks is longer), savings from new CAFE standards are not fully realized until some time after the standards take effect. Figure 1 shows the increase in oil savings rate (Mbd) and the accumulated savings (billions of barrels) for S. 279 in the absence of delays, weakening policies, or truth-in-testing. No further increase in standards is assumed after 2001, and the estimates are given relative to new car and light truck efficiencies frozen at 1990 levels. Delays in the standards would have the effect of shifting the curves to the right, so that comparable savings are achieved in a later year.

1.6 Other effects

Other factors which can impact the effect of CAFE include the following.

(a) Changes in market shares by various manufacturers. Our analysis holds market shares, as well as size and performance characteristics, constant at 1988 levels. Changes in consumer tastes, marketing strategies of manufacturers, as well as changes in prices, and other exogenous factors, could result in different mix of vehicles by 2001. The effect of a percentage increase approach is less predictable than that of a fixed standard. For example, if manufacturers of fleets that are now more efficient than average gain market share, the savings will be higher; the converse is also true. We have not attempted to examine this effect; however, we believe it is very unlikely that it would be large enough to have a major impact on the fuel savings from CAFE.

(b) CAFE carry-forward credits. To the extent that some manufacturers' CAFE levels are greater than that required and they can carry a mpg credit forward to reduce their required targets in years specified by the standard, there will be a delay in achieving the full percentages increases desired in 1996 and 2001. The savings reached in those and subsequent years will therefore be lower, although the mandated levels will eventually catch up as credits are exhausted. In any case, the effect is to delay rather than ultimately reduce the achievable level of savings.

(c) Changing the "floors" and "ceilings" which give mininum and maximum required levels for each manufacturer. Our analysis includes the effect of the stated ceilings in S. 279 (45 mpg for cars and 35 mpg for light trucks in 2001); removing these ceilings would increase the savings by about 4%. The effect of the floor (minimum required CAFE) was not addressed, but it is expected to be similarly small. There is, in fact, a continuum of floor and ceiling levels consistent with a 40% improvement in fuel economy. In the limiting case, the floor meets the ceiling at a single standard for all manufacturers, like the earlier CAFE standards. Tightening the floor and ceiling boundaries could be considered as a way to change the balance of the burden among manufacturers presently having lower or higher fleet ratings. It would also make the standard more robust with respect to the changes in market shares noted above.

(d) Changes in the overall amount of driving. Total vehicle miles of travel can be decreased by policies to reduce the need for motor vehicle travel, increase vehicle ridership, or increase alternate modes of travel. We have not attempted to analyze such exogenous VMT effects. (See the discussion below, in Section 2, regarding the VMT rebound effect postulated by DOE.)

(e) "Zero overshoot" refers to assuming that manufacturers exactly meet their CAFE targets, rather than exceed them by a "safety margin." Historically, in attempting to meet CAFE standards, manufacturers have exceeded CAFE targets with a safety margins of about 0.7 mpg for passenger cars and 0.2 mpg for light trucks. This mpg "overshoot" was assumed in modeling the new CAFE levels. The effect of this safety margin is small; if target standards were reached exactly, there is a 4% reduction in savings.

1.7 Summary table

The following table summarizes the effects that have been quantified.

Effects of various factors on the oil savings in 2005
projected for a 40% CAFE increase by 2001

	CAFE (mpg)	Savings (Mbd)	Percent difference
ACEEE estimate for 40% CAFE increase	40.5	2.5	0
Variations:			
(1) Zero mpg overshoot	39.9	2.4	-4%
(2) Rollbacks to S. 279 limits and (1)	37.4	2.0	-20%
(3) Flexible fuel credits and (1,2)	36.2	1.8	-28%
(4) Truth in testing and (1,2,3)	36.2	3.5	+40%
(4) Fee/rebate incentives and (1)	42.0	2.8	+13%
(6) Fee/rebate incentives and (1,2,3)	38.0	2.1	-18%

2 COMPARISON WITH DOE ESTIMATES

Subsequent to the introduction of S. 279, the Bush administration, through the Department of Energy, stated that savings from S. 279 would be only 0.5 Mbd. An immediate question, therefore, is to account for the very large (factor of five) discrepancy between this estimate and the nominal estimate of 2.5 Mbd made by ACEEE. The following table summarizes the answer to this question. It is presumed that DOE used the "zero overshoot" assumption discussed earlier; this small effect is noted first to keep subsequent comparisons on a common footing.

Effect of negating assumptions on the oil savings in 2005
projected for a 40% CAFE increase by 2001

	CAFE (mpg)	Savings (Mbd)	Percent difference
ACEEE estimate for 40% CAFE increase	40.5	2.5	0
Adjustments:			
(1) Zero mpg overshoot	39.9	2.4	-4%
(2) DOE market mpg increase and (1)	39.9	0.9	-64%
(3) VMT "rebound" of 20% and (1)	39.9	1.9	-24%
(4) Flexible fuel credits and (1)	38.9	2.2	-12%
Combined adjustments (1,2,3,4)	38.9	0.5	-80%
(5) DOE VMT base and growth and (1)	39.9	2.1	-16%
All negating adjustments (1,2,3,4,5)	38.9	0.4	-84%

By far the largest source of discrepancy is DOE's assumption that market forces will induce significant increases in fuel economy even in the absence of new CAFE regulation. DOE's projected increases for cars are 33 mpg by 2000 and 37 mpg by 2010, with a comparable rate of improvement for light trucks. On the other hand, new fleet fuel economies are currently on a declining trend, after having peaked in 1988. Oil prices remain low in spite of the recent transient instability; the future price is difficult to predict. New taxes that might significantly increase the consumer price for gasoline do not seem to be in the works. For these reasons, we feel that frozen efficiency is a much more credible reference for estimating the savings from new CAFE standards.

The second largest source of discrepancy is the so-called "rebound" effect. DOE assumes an elasticity of 20% for VMT with respect to fuel economy, i.e., that each 10% increase in fuel economy results in a 2% increase in VMT because of the lowered cost of driving. By this reasoning, the 40% increase in 2001 would result in an 8% increase in VMT relative to frozen efficiency. Recalculation of the VMT growth using this high value for the elasticity, with both my original VMT series and the DOE's own VMT series, shows that a 20% "rebound" effect lowers the projected savings by a similar amount, as shown in the table. In our judgement, the 20% rebound assumed by DOE strains credibility. A recent review places the average estimated value at about 10% based on past history,[3] but also notes that the expected value is declining. This follows common sense, since fuel costs now amount to only about 12% of total cost of owning and operating an automobile, and this cost share will continue to decrease as fuel economy increases. For the 2001-2010 time frame, with new CAFE standards, we take 5% to be a more credible value for any possible rebound effect, with a similarly small impact on the savings from CAFE.

Flexible fuel credits were discussed in part 1; if available, it is likely that manufacturers will take full advantage of them to the extent that adapting a vehicle for flexible fuel use is cheaper than improving fuel economy. This is the only adjustment made by DOE which we feel is reasonable. As noted earlier, ACEEE believes that flexible fuel credits against CAFE are a poor way to further the introduction of alternative fuels.

A final source of discrepancy is a differing basis and growth rate for vehicle miles of travel (VMT). ACEEE's VMT numbers start from a higher base (due mainly to the use of different survey data) and grow more rapidly in earlier years (due mainly to a higher population growth rate than assumed by DOE). The projected VMT difference in 2005 is about 16%, which directly affects the savings estimate.

In summary, the main sources of difference between the ACEEE and DOE estimates of the savings from new CAFE standards relate to the assumed growth in fuel economy in the absence of new regulation and the rebound effect. We dispute the magnitude of both of these adjustments and feel that our estimate much more closely represents the savings expected from a new CAFE-40 standard. As noted in our "Savings from CAFE" statement, there is always uncertainty in making such projections into the future. We stated then, for our nominal estimate of 2.5 Mbd savings (from "unadulterated" CAFE-40), that the range of certainty was between 2.0 Mbd and 3.0 Mbd. We have not been made aware of information that would lead us to revise this confidence level, which we feel is sufficient to guide policy makers regarding the benefits of new fuel economy legislation.

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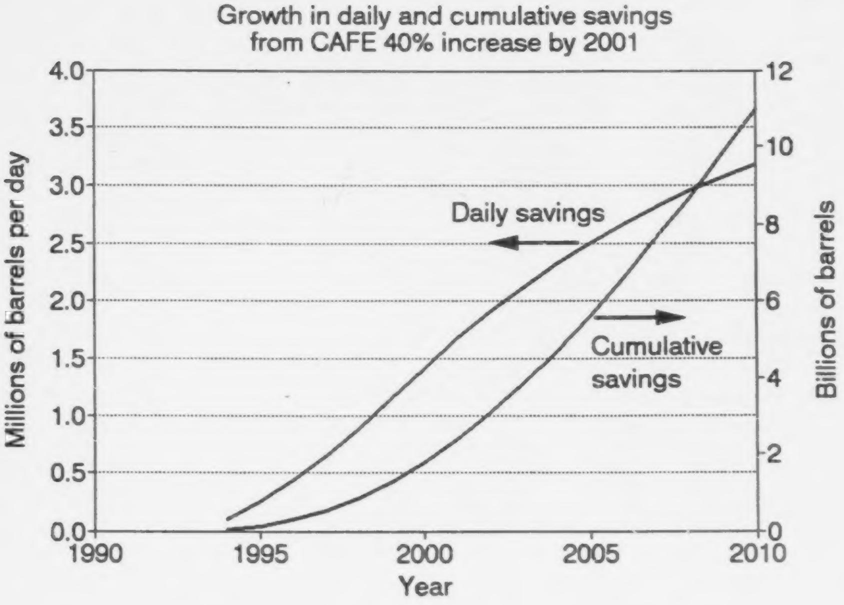
[3] Greene, D.L. Vehicle use and fuel economy: How big is the "rebound" effect? Draft paper, Center for Transportation Analysis, Oak Ridge National Laboratory, February 13, 1991.

Figure 1


Growth in daily and cumulative savings
from CAFE 40% increase by 2001
Millions of barrels per day
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Billions of barrels
12
10
8
6
4
2
0
Daily savings
Cumulative savings
1990
1995
2000
2005
2010
Year

The Advanced Automobile Development Challenge

A publicly funded competition and incentive program for bringing super-efficient automobiles to market in the United States

DRAFT LEGISLATIVE PROPOSAL

John DeCicco
American Council for an Energy-Efficient Economy
11 March 1991

This is a proposal to provide the United States' automobile industry with a special incentive to develop and market affordable automobiles which achieve ultra-high fuel economy and low emissions, meet contemporary standards of comfort, safety, and reliability, as well as guarantee competitive domestic production. These requirements are but a visionary extension of what the American public already wants in an automobile. The objectives set out in this proposal will be a technological challenge worthy of the best efforts of American engineering. The vehicles designed will offer an opportunity for global leadership by American workers in building world-class automobile fleets of the future. By providing cash incentives and an initially assured market for the qualifying vehicles, the American public will share with industry the cost of bringing about a major leap forward in automotive technology in the United States.

The Advanced Automobile Development Challenge will offer manufacturers a chance to compete for a top award, but also, recognizing the strength of a competitive marketplace, will offer significant awards to all manufacturers who develop qualifying vehicles. A qualifying entry for the Challenge is any vehicle of planned domestic manufacture which meets the Advanced Standards of Excellence defined for the Challenge. The Advanced Standards of Excellence are a set of specifications, detailed below, that insure the acceptability of entries in automobile market and the achievement of significant improvement in fuel efficiency. Administration of the Challenge and certification of entries as meeting the Advanced Standards would be performed by the Department of Transportation. Vehicle prototypes meeting the Standards would then be ranked in terms of overall excellence, with the highest ranking entry receiving the top award. Although the Challenge would be administered by a governmental agency, it would be judged by a panel of representatives from industry, labor, automobile dealers, and public interest organizations.

ADVANCED STANDARDS OF EXCELLENCE

The types of automobiles developed should be of comparable comfort and utility to popular four-passenger automobiles to which Americans are accustomed today. A publicly funded initiative of this significance should focus on such vehicles, since their features provide the best guide to what is valued by the public in a passenger car. While options such as air conditioning and other comfort amenities are not required, the vehicles should be capable of offering these common options and amenities without a significant erosion of performance. The table below lists the key characteristics that vehicles developed for the Challenge will be required to meet.

ADVANCED STANDARDS OF EXCELLENCE Qualifying Specifications for the Advanced Automobile Development Challenge	
Fuel economy	80 mpg (38 g/mi carbon equivalent)
Size	100 cubic feet minimum interior volume, passenger plus cargo areas
Emissions	0.13 gram/mile non-methane hydrocarbons 1.7 gram/mile carbon monoxide 0.2 gram/mile nitrogen oxides
Safety	Advanced safety technology and design features for passenger protection (see text).
Performance	Handling, braking, and acceleration characteristics sufficient for safe driving.

The minimum fuel economy target for entries is 80 mpg (combined city and highway EPA test rating). This target was established by calculating the performance (CO_2/mile) needed to achieve a 20% cut in automobile related carbon dioxide emissions in 2005 (absolute reduction, from a 1990 base) if one-third of the cars on the road achieve the 80 mpg target at that time.[1] It represents a 170% increase in the current fuel economy achieved by new cars in the size classes considered for the Challenge.[2] The fuel economy rating is to be calculated as a CO_2 emissions equivalent to gasoline at 80 mpg. This level of energy efficiency may be achieved using gasoline, diesel, or alternative fuels including electricity, provided the net carbon emissions (tailpipe and upstream), using national average energy resource characteristics, do not exceed 38 grams per mile.[3]

The vehicle size is specified in terms of the combined passenger plus cargo interior volume, which should be at least 100 cubic feet for qualifying entries. The median size of 1990 new cars is 107 cubic feet, with over 50% of models sold falling in the range of 100-120 cubic feet interior volume.[4] The tailpipe emissions from entry vehicles must meet advanced air quality standards. The emissions specifications given here are based on the proposed Tier II standards in the 1990 Clean Air Act amendments.[5] The entry vehicles must also meet enhanced safety standards as well as have performance characteristics comparable to current models in the specified size class. In addition to currently mandated safety standards, vehicles meeting the Advanced Standard of Excellence should have full front air bags, improved side-impact protection, anti-lock brakes, better stability against rollover, vehicle body features that reduce pedestrian injuries, and improved bumper standards.

AWARDS

Manufacturers of winning vehicles would receive not only a reward and recognition, but also an assured level of initial sales from a combination of public and private commitments to purchase winning vehicles. Innovation by many manufacturers should be encouraged, so the cash rewards will be allocated over all entries meeting the Advanced Standards of Excellence. As an inducement beyond simply the recognition that would come from winning the competition, the government should commit a portion of its own fleet vehicle acquisition plans for the purchase of the winning entries and set up commitments for matching purchases by other operators of vehicle fleets. Other purchasers, who would become co-sponsors of the competition, could be companies, state governments, car rental firms, perhaps even a co-sponsoring "Advanced Challenge Motor Club" of consumers who wish to be guaranteed delivery of some of the first models.

The specific awards and inducements for the Challenge are as follows:

(1) Cash awards for top entries

The manufacturer of the top qualifying vehicle would receive a cash award of $100,000,000. All entries, certified by the Secretary of Transportation as meeting the Advanced Standards of Excellence, would be scored by the Panel of judges seated for the Challenge. The vehicle receiving the highest scored would be designated as the top entry. An objective method of scoring vehicle attributes would be delineated by the Secretary of Transportation when administration of the Challenge is established. The next four manufacturers with high ranking entries which meet the Advanced Standards of Excellence would receive research compensation awards of $25,000,000. Cash awards are limited to one per manufacturer.

(2) Rebates for each vehicle sold in private market

A financial incentive equally applicable for all manufacturers developing vehicles that meet the Advanced Standards of the Challenge are rebates paid by the federal government to manufacturers for each qualifying vehicle sold. It would be the option of the manufacturer to pass on some or all of this rebate to consumers, e.g., by a lowered sales price or cash rebate. The amount of the rebates is set to provide a reasonable share of the sales induced by the competition and compares favorably to rebates commonly used by manufactures in sales promotions. The proposed rebate level is $1000 per vehicle sold. Rebates should be limited to the first four years of sales with a sales volume ceiling of 50,000 vehicles per year per manufacturer, so that the cost to the treasury is predictable. Manufacturers may develop more than one vehicle for entry into the competition, and all models meeting the Advanced Standards qualify for rebating; however, the annual ceiling applies the total of qualifying vehicles by each manufacturer.

(3) Fleet purchase commitments

Various branches of government (federal, state, and local) purchase over 100,000 new automobiles each year. Committing one-half of these to vehicles meeting the Standards of the Challenge will provide an additional, guaranteed sales inducement to man-

ufacturers. Requiring that half rather than all of new government fleet purchases be Challenge-qualified vehicles should leave sufficient flexibility for meeting specialized needs by agencies. Federal fleet purchase commitments would not qualify for the above rebate, so that this part of the incentive is achieved with negligible added cost to the treasury. State fleets outnumber federal fleets by almost 10-to-1, so getting states to participate in the purchase commitments would greatly increase the incentive. State and local fleet would qualify for the purchase rebates.

DELIVERY REQUIREMENTS

Any manufacturer wishing to enter the competition must deliver six identical vehicles to the Department of Transportation within the three-year entry deadline established upon announcement of the Challenge. Testing and evaluation of the vehicles will be completed nine months after the final delivery deadline, so that winners will be announced and cash awards given one year after the delivery deadline. Vehicles sold to the public will earn the rebates for their manufacturers for the four model years immediately following the delivery deadline. Manufacturers will be free to market their entry vehicles in advance of the announcement of winners and, if the vehicles are found to qualify, can earn rebates retroactively. Government fleet purchases need not start until the first year following the delivery deadline.

A hypothetical program schedule, assuming enactment of legislation to establish the Challenge in 1991, is as follows.

> December 1991: Secretary of Transportation formally announces the Challenge and issues specifications for the Advanced Standards of Excellence.
>
> December 1994: Deadline for receipt of entry vehicles. Vehicles may be presented prior to this deadline as soon as the Department of Transportation indicates it is ready to receive entries for testing.
>
> September 1994: Announcement of winning entries, cash awards to top entry and the four runners-up.
>
> Model years 1995-1998: Rebates to manufacturers meeting the Advanced Standards of Excellence, up to the limits specified under Awards.

BUDGET

Based on the awards estimates given above and providing for program administrative costs (including testing and certification of entries), the total budget for the program would be as follows:

Cash awards	$ 200,000,000
Rebates	1,200,000,000
Administrative costs	100,000,000
TOTAL	$1,500,000,000

Rebates are estimated on the basis of six qualifying manufacturers and rebates for 50,000 vehicles per year over 4 years. The total rebate expenditure may be smaller than this estimate if sales do not reach the 50,000 level for all years or less than six manufactures qualify. It should be noted that this budget is spread across several years, with most of the funds being required over the four years of the program during which rebates are offered.

The revenue required to implement the Challenge could easily come from an earmarked portion of an oil import fee. Petroleum imports are expected to be at least 8 million barrels per day over the next several years.[6] Over the first four years of the program, over 11 billion barrels would be imported, and a fee of only 14 cents per barrel (0.3 cents/gallon) could generate the revenue required for the program.

OTHER CONSIDERATIONS

This draft is intended as a discussion piece, and so a number of details relating to the standards, competition rules, and other consideration remain to be worked out. Among the other issues which should be addressed are the following:

Domestic manufacture, to insure that it is United States industry that benefits from the incentives.

Timely promulgation of the Advanced Standards of Excellence, so that manufacturers have sufficient time to refine their designs.

Driveability requirements, regarding starting, braking, acceleration, grade climbing, passing ability, and handling characteristics under commonly encountered road conditions.

Service life, maintenance requirements, and reliability.

Prices of the vehicles and rebate level; the incentives have been designed to reward actually getting the advanced vehicles on the road, so that most of the funding is contingent on actual vehicle sales to the public rather than development of prototypes. A contingency that entering manufacturers demonstrate ability to deliver vehicle might also be considered.

A related proposal for a government-sponsored competition was introduced in 1982 by former Rep. William Shamansky as the "Automobile Research Competition Act" (97th Congress, H.R. 5880). Although this bill was not enacted, it does contain some considerations which might be useful in developing the present concept into a more specific legislative proposal.

NOTES

1. The combined urban and highway EPA rated fuel economy of all cars on the road must reach 48 mpg in 2005 to achieve the stated CO_2 reduction target, assuming passenger car VMT of 1.8 trillion (10^{12}) miles and a congestion factor of 25%. The target of 80 mpg is then obtained by further assuming that the remaining two-thirds of the cars on the road have an average EPA rating of 40 mpg in 2005.

2. For 1990 model year automobiles in the 100-120 cubic foot size range, the sales weighted average fuel economy is 29.5 mpg (combined EPA tests), slightly greater than the overall new car fleet average of 27.8 mpg.

3. Based on fossil carbon emissions of 22.9 kg/GJ (G. MacDonald, Annual Review of Energy 15:53-83, 1990), which includes CO_2 emissions from combustion as well as fuel production and transportation. Using this carbon emissions rate and an energy content of 125,000 Btu/gallon with the gasoline fuel economy target of 80 mpg yields the value of 38 g/mi (0.83 lbs/mi) of vehicle travel.

4. Fuel economy ratings based on EPA 1990 Gas Mileage Guide, October 1989; sales statistics from Ward's Automotive Data and Motor Vehicle Manufacturer's Association.

5. EPA, The Clean Air Act Amendments of 1990, Summary Materials. Office of Air and Radiation, U.S. Environmental Protection Agency, Washington, DC, November 15, 1990.

6. U.S. Department of Energy, Annual Energy Outlook 1990, with projections to 2010. Report DOE/EIA-0383(90), Energy Information Administration, Washington, DC, January 1990.

The **Chairman**. Well, what do you say of that testimony that says, in order to do max tech which is below the Bryan bill, it would cost $800 an automobile; do you disagree with that?

Mr. **DeCicco**. I disagree with that. Our numbers add up differently. Also, I feel sort of calling that level of improvement "max tech" is sort of a misleading use of a word like maximum, in that we feel that numbers well into the 40's are more appropriately characterized, for the reasons I mentioned and others I can go into in more detail.

The final point that I want to make before wrapping up is on the safety issue which has been raised and has been raised by the administration.

The argument that CAFE standards increase highway fatalities is misleading. It ignores the historical record of simultaneous improvements in both safety and fuel economy. We feel that it is disingenuous when made by an administration, and automakers more noted for foot dragging than leadership on safety issues.

Indeed, significant improvements in CAFE have the full support of the leading public interest advocates for auto safety, including the Center for Auto Safety.

Finally, I agree with your statement earlier, Mr. Chairman, that we should stretch and challenge our automakers to provide us with cars that are much more fuel efficient. The question, how far should we challenge them to go, and I believe that it is owed to the American public as well as to the workers that we set visionary standards, standards that by looking at the technologies now available sitting on the shelf, as well as the technologies that we know about and can be taken into implementation in the 10-year time frame, that our number on that that we have published is 44 miles per gallon.

We feel, therefore, that allows a very wide margin for problems and so on in reaching a CAFE 40 percent increase.

Thank you.

The **Chairman**. Thank you, Mr. DeCicco. You heard the testimony of Mr. Olson and others about gaming. Is there a way to fix the gaming, or are you just not worried about that?

Mr. **DeCicco**. I can answer affirmative in both. We are not worried about that. The impact of that, when you look over the whole fleet, we have not done the analysis. Something like that would be very hard to do.

Of course, you have to speculate about what type of gaming might happen. I do not believe that the impact would be very large.

On the other hand, I think some of the complementary policies that I have in my written testimony could help alleviate the concerns of gaming with respect to lost potential savings, and I also would like to point out that as crafted, a uniform percent increase also includes floors and ceilings in the regulation.

By a floor, I mean there is a minimum level which a corporate fleet must reach. A minimum absolute MPG level. And then a ceiling which protects our manufacturers that now have high MPG fleets. The ceiling, I believe in S. 279, is 45 MPG per cars. They are not required to go above that in doing their 40 percent.

I believe that between complementary policies and perhaps an adjustment of the floor and ceilings that could be done while maintaining the same level of savings, that the gaming problem can be easily addressed.

The **Chairman**. Did you read the editorial in the New York Times 2 or 3 weeks ago in which, in effect, they criticized CAFE. They said the solution is an energy gas or a gasoline tax, I forget which one they said, and they simply pointed out that when the price of gasoline is going in one direction, there is only so far you can stretch with CAFE.

Now, nobody is seriously proposing any kind of energy tax, which means that the price of gasoline in historic terms and in miles per gallon traveled is close to the lowest it has ever been.

Now, how are you going to make American consumers go for a higher miles per gallon when the price of gasoline is going lower? How are you going to get them to, influence those consumer choices?

Mr. **DeCicco**. I think consumers, as the polls indicate, do value fuel economy.

The **Chairman**. That is the polls, but that is not the market place.

I went to lunch with a couple the other day, and the guy's wife was telling me this very thing. We need to get stronger CAFE standards. And I had ridden out with them in their Lincoln Town Car, literally.

I mean, that is your problem. Everybody is for it in theory, but how are you going make them do it?

Mr. **DeCicco**. That is, indeed, the problem, and that is the reason why the regulation is needed. My brother-in-law and sister wanted to buy a light truck recently. They had two small cars and they wanted to buy a small pickup truck.

They wanted one that was fuel efficient. They were appalled at what was available in the market in terms of fuel economy in light trucks.

So, at any given time, consumers buy what is out there. We believe it is in the national interest to make the whole set of what is out there much more fuel efficient. Fuel economy standards will not ban any type of vehicle from the market place.

If you pay the price, you will be able to get basically what you want. What we would like is that the whole fleet be shifted, and we feel the technology is available to do that.

The **Chairman**. Did you want to get into this, Mr. Geller?

Mr. **Geller**. Well, we want to do that, too.

The **Chairman**. As I said, we want to stretch Detroit not as far as they want to go, but as far as we can push them to the outer limits, consistent with keeping market share as best we can, consistent with keeping jobs, consistent with the American economy, all those things.

I look at 44 miles per gallon, and I hear Mr. Duleep and Mr. Plotkin testify that, for example, they said that max tech scenario in 2001, which is well, well below. They are talking 36 miles per gallon, and you are talking 44.

They are saying 36 miles per gallon, in effect, would require a heavy retooling burden, the redesign of all products, and unprecedented and risky changes in those products.

I take it you do not agree with that?

Mr. DeCicco. No, we do not agree with that. I think that is overstated, and I think if one were to look back on the record OTA and even DOE over the last year or two, you will find that that is going beyond what they themselves have documented.

As I said, like ourselves, we do not have the means to develop an independent database such as that of EEA, but we have reviewed carefully.

The Chairman. Excuse me. Staff tells me that Duleep said that today and he said it in June of 1990.

Mr. DeCicco. Yes. We start the record back a little further than that.

The Chairman. Let me say that if we disqualify everybody from testifying before this committee because of past mistakes, there will be a deathly silence here, believe me.

[Laughter.]

Mr. DeCicco. One of the things we have a concern about is that we believe the analyses of EEA are not very good, and they have stood up to a lot of scrutiny. The kind of scrutiny to which they have been suggested, we believe, is somewhat lopsided, though, in terms of that we do not believe that it is been a fully balanced critique.

We wish we were in a position, and we are working, trying to gather more information, to redress that imbalance.

If I could go into some of the other differences and assumptions that result with our coming out with a higher number, if you are interested in that.

A very important one, of course, is the performance levels. For the reasons that I said, I do not believe that the legislation should be essentially mandating current performance or even presuming that the increasing trend will continue. We just do not believe that that is in the national interest.

The Chairman. What has caused that trend that has taken place? You point out now that there is available in the market place any kind of car anybody wants, and yet, performance and MPG, I mean, performance and size are staying about the same, I think, and the performance is going up.

Why is that?

Mr. DeCicco. Basically, we believe it has to do with the fact that the CAFE pressure is now off?

The Chairman. Is not that because of the price of gasoline?

Mr. DeCicco. With the prices as low as they are, and even, we believe, even taxes or small increases would not change the picture that much, the original need for the regulation remains the same. It is that the marketplace, the first cost to the buyer, the buyer's decisions do not adequately reflect what is in the national interest.

When you do not have the regulation to pull technology forward for greater fuel efficiency, the market will work. It is an outcome of the market place. That is why we need the regulation.

The Chairman. If I could afford it, I would buy a sports car. But what do you do about that kind of perversity?

Mr. Geller. It seems to us that the marketing emphasis, which obviously has an influence or it would not be occurring, the advertising cost money, that has been emphasizing power, the muscle cars, the higher horsepower, the faster acceleration, has been a leading marketing strategy over the past few years.

That clearly has had an impact, and fuel efficiency has not been high on the priorities of the marketing departments in the auto industry. They do not have the higher fuel economy standards to push it.

The CHAIRMAN. Nothing prevents them from pushing miles per gallon as a marketing strategy. Why do they not do that?

Mr. DECICCO. I believe it is pushed as far as it will go in the market. That is the basis.

The CHAIRMAN. Precisely. Is not the customer requirements, customer choices? How do we dictate those customer choices? Is it advertising?

Mr. DECICCO. If the fuel economy standards were higher, we got to where we are now by standards.

The CHAIRMAN. Did we? Or was it that price of gasoline? You saw that chart where the price of gasoline is?

I am not saying CAFE did not have a major role, but I think it is pretty hard to prove that which is technology, that which is CAFE, and that which is price of gasoline per gallon.

Mr. DECICCO. It certainly is very hard to really do that decoupling, but every analysis that we have seen, the leading analyst for the Department of Energy and for OTA and other agencies, have all concluded that CAFE clearly has had a major impact and that CAFE is the most important factor.

The CHAIRMAN. I do not think you can say how much.

Mr. DECICCO. Everyone realizes gasoline prices are at an all time low now. They went up, and they came back down. Fuel economy continued to increase throughout the 1980's as the price steadily dropped.

Mr. DECICCO. What has been absent in the market because the prices have gone up and down is the absence of a sustained signal to consumers and to manufacturers. The CAFE regulation, on the other hand, provides that kind of a sustained signal. You look out 10 years and you know what you want to happen. In an economy like ours, which has so many benefits, we do not impose those kinds of sustained signals through the price system.

The CHAIRMAN. We want to do that—I say we want to do it through the price system. I do not think the Congress wants to do it through the price system. The American public does not want to do it through the price system, and they are dead wrong in all that—both the Congress and the American people—but that is the way it is going to be.

I proposed that tax back in the 1970's and got a fire storm of opposition and no praise, not from the environmentalists, not from anybody. Mine was a 50 cent tax—10 cents a gallon.

Mr. DECICCO. We would support you if you proposed that again. We would applaud you.

The CHAIRMAN. I reached back to see where the environmentalists were, and they scattered like a covey of quail.

[Laughter.]

The CHAIRMAN. Mr. Boltz, you were—earlier, on the question of gaming, you were shaking your head. Did you have something you wanted to tell us about how to fix the gaming problem?

Mr. BOLTZ. I would like to make several comments not only on that issue but on a few other things we have heard, and issues raised today.

The CHAIRMAN. By the way, I wish all of the big three would address for the record the gaming issue. Mr. Olson, your testimony was excellent on that, and I think that is a very, very serious issue, and if there is a way to fix it, we want to fix it, and if there is not we want to be able to say why there is not.

Mr. BOLTZ. I would simply suggest that I believe the problem of new entrants in fact can be addressed quite efficiently and objectively again by administrative rulemaking action.

I think the Department of Transportation and the Secretary of Transportation could quite easily be requested to develop a solution to that problem. There is quite a bit of data that could be used, not only the interior size of vehicles, their weights for 1990.

Certain standards for new entrants could be established. Those could be established either by the Secretary or as part of this legislation that would lay out the ground rules for anyone in the future in an objective manner.

The CHAIRMAN. We would solicit your draft of that.

Mr. BOLTZ. I would be happy to send you along a few ideas in response to your question.

[The information requested was not received at the time the hearing went to press.]

Mr. BOLTZ. I would like to highlight something that I saw this morning that I think is quite important, and I would like to remind the committee of one or two issues.

This morning you were shown some figures for domestic passenger cars and for domestic light trucks, in terms of CAFE capability for 1996 and for the year 2001, and I think the relevant lines on some of those charts—one of them referred to product plan, the other referred to maximum technology.

Senator Johnston, other members of the committee, I think it is very, very important, as you look at the year 2001, at something like 31.9 miles per gallon, that implies a degree of precision that forecasts perhaps would not support.

You have to be careful of the numbers, but please do not take away the numbers alone. Take away the caveats that were placed on them as well. Be very careful, in looking at the data, to remember what was said about the product plan, its economic practicability, perhaps what was not said about economic practicability—the max technology case—because those figures are only as good as the assumptions and the caveats and the concerns upon which they are based.

I would like to point this out, and I will quote. I believe this is correct, Mr. Plotkin. He says, "It is conceivable"—conceivable—"that something like the max technology scenario can be achieved."

I would like to underscore that this industry—the automobile industry—is a $180 billion industry, and if great care—beyond something that is conceivable, if great care is not taken to ensure that it is economically practicable, the very jobs that you speak about, Senator Johnston, and a variety of other issues on your criteria, are indeed at risk. It is very important.

The CHAIRMAN. At the same time, you remember Mr. Plotkin also talked about pushing the years back to make it more economically feasible, and I really want to solicit each of your views in writing on that, if anybody wants to add anything more on that now.

I mean, obviously a higher miles per gallon would be required, higher than what we might otherwise do, the more you move your years back, but I think what Mr. Plotkin was saying is that it is easier to achieve a more robust goal later than earlier, because there is so little choice earlier. So think about that, and give us a response.

[The information requested was not received at the time the hearing went to press.]

Mr. BOLTZ. It is in effect a sliding scale.

I would like to make one comment about issues raised several times regarding 1987 performance levels, or 1988 mix, or a variety of things. Again, it is the concept of going back in time. It is a convenient analytical concept, but no one has brought to this chamber a method of how to do that, a mechanism to go back in time.

If someone has such a mechanism, there are a few other years I would like to revisit—not necessarily 1987. Personally, for me 1979 was a good year. You may have a different choice.

But the point is, getting back in time is very, very difficult.

The CHAIRMAN. I do not remember the cars from 1987 that well. I remember there was a while there that some of those cars would hardly pull the hill, but that was earlier than 1987, was it not?

Mr. BOLTZ. I guess I am less concerned about which year one picks, Senator, as the mechanism by which one could go back in time, change the market from what it is today, and simply suggest that people return to a different era and have different behavior, because there is not a very good way to do that, other than perhaps a gasoline tax, as some have suggested.

Finally, I would like to suggest that as you review some of the data and the uncertainties that it includes, I would just like to mention that with regard to the product plan, I think Mr. Duleep's analysis is probably quite sound in terms of its ability to follow up the industry, to track the industry and suggest that a manufacturer's product plan between now and 1996 could yield a certain fuel economy level.

We in the industry, at least Chrysler, do a very comprehensive product plan out 5 years in general. Frankly, I do not have a product plan at Chrysler that has any credibility internal to Chrysler, much less outside of it, for the year 2001.

So as we go into the future, as you look out 10 years from today, for someone—anyone—to suggest that there is a product plan that is durable for a 10-year period, I would submit, sir, that they change a lot faster, in my experience, than that, and I would have a little bit of difficulty in accepting anyone's analysis as a point number.

Perhaps a broad range, but as a point number, as to what manufacturers—the industry could do as a whole 10 years hence by product plan, that is a—perhaps a personal issue, but as a product planner, and in fact as Chrysler's product strategist, I can assure you that we have no volumes or product plans for the year 2001.

The CHAIRMAN. We understand that. Ms. Whitman, you wanted to get into this.

Dr. WHITMAN. Could I make a couple of quick points? One is with respect to gaming, and Mr. Boltz has suggested a possible solution to one particular aspect of gaming which was raised, but the truth is that any future system will be gamed. The current system is gamed, and some examples of that have been mentioned already.

As long as there is a regulatory situation which tries to make the industry do something but give the customer no incentive to accept what the industry has to do—in other words, as Mr. Boltz put it, as long as we are being pulled by two horses in two different directions—of course people will desperately try to game the system to lose as little customer satisfaction as possible, to lose as little market share as possible, to lose as few jobs as possible.

The CHAIRMAN. By the way, Mr. Boltz, you said you thought we could maybe fix it with some language. Does that include the rebadging, as well as the new entrant problem?

Mr. BOLTZ. Absolutely.

The CHAIRMAN. Do you think you could refix the rebadging problem, Ms. Whitman?

Dr. WHITMAN. I would have to think a bit about it, but I think the point is that probably one could address any one of these particular issues. That will simply produce new ways of gaming the system, as I say, as people try desperately to minimize the damage. That is one point, and that is inherent, as long as the manufacturers are being pulled toward two different ways.

The second point is a comment made about possible future technologies, and the two-stroke engine has been mentioned a number of times today, and indeed we are working very hard on the two-stroke engine. We have licensed that technology. So has Ford. Other manufacturers may have as well.

At the moment, there are some significant problems with it. One is, as was mentioned, it does not meet emissions requirements in use. The other thing is, at the moment it has severe durability problems which could lead to a very high degree of customer dissatisfaction and other problems.

We are working very hard to overcome them. We hope they will be overcome, but we have no guarantee that they will be overcome, and therefore to build an assumption about that in, I would submit would be playing with fire.

The CHAIRMAN. Let me ask you, how would you fix this problem—and this may not be a problem, but let us say that Plotkin and Duleep are correct when they say if you went all the way to the Bryan standards and could not meet them—so the way to do it would be to do away with the sports cars and the larger models.

So Mercedes over here, I think they have only larger models, do they not? Is that not right? So what would keep Mercedes from putting out a cheaper, larger model that has a lower miles-per-gallon requirement? Do you understand what I mean?

Dr. WHITMAN. I am afraid not.

The CHAIRMAN. All right. You do not have any more big Fords or Cadillacs or New Yorkers, or whatever, and the customer still wants to get the bigger car, and here Mercedes has only one kind of car which has a lower miles-per-gallon requirement, so in order to meet the Bryan bill it need only make a percentage increase off of a lower standard.

Now, the question is, what is to keep Mercedes, either through rebadging or through—just coming out with a new model, a Mercedes econo-car that fills that niche?

Dr. WHITMAN. I guess I am still confused, but let me address what I think is the same kind of question.

The CHAIRMAN. Am I addressing a real problem? Can anybody——

Mr. OLSON. I understand what you are saying.

The CHAIRMAN. How do you deal with it, Mr. Olson?

Mr. OLSON. I do not think there is a way to deal with it, because they are protected by a lower CAFE umbrella and they could indeed—what you are addressing is the cost of Mercedes. If they could build a car under that lower CAFE umbrella that has size and utility of a Crown Vic at the same price, they could indeed replace the Crown Victoria, which would be forced out of the market by the higher CAFE umbrella that——

The CHAIRMAN. Could you sell the Crown Victoria factory to Mercedes and put the Mercedes emblem and be done with it?

Mr. GELLER. As I understand the question, they would still have to meet their mandated efficiency improvement or percentage efficiency improvement level, and if they do not do that, they can choose to pay the penalties. They are not required by law——

The CHAIRMAN. Right, they would meet the percentage, but what is a Mercedes right now? I think it is 22 MPG.

Mr. PESTILLO. They are going the other way. Their next model is a new high-priced V-12, so they are going at the higher end still. The obligation is only to pay the penalty currently.

Mr. GELLER. They are willing to pay the penalty and so are the other manufacturers if they cannot come up to the requirement.

The CHAIRMAN. Well, what I am saying is there may not be a problem and maybe this is not a real problem. But I fear that what you would end up is just American manufacturers going out of business, the nitch being filled by someone else. Gaming the system—I mean sure they have to increase from 22 miles a gallon to 27, let us say, instead of from 27 to 34.

Dr. WHITMAN. Senator, that is a very real danger under the present, too. That is, when we talk about the disadvantage to full line manufacturers under the present system, that is, manufacturers who come historically off a small car base have much more leeway to build less fuel efficient cars in larger size categories and push out traditional full line manufacturers who may have cars that are just as fuel efficient or more fuel efficient in that size category but do not have nearly the leeway because of their size mix.

The CHAIRMAN. Well, that is a little different problem, but it is a problem.

Dr. WHITMAN. That is the problem under the current—the way the legislation is currently structured and that is what we mean primarily when we talk about the great disadvantage to historical full-line manufacturers.

The CHAIRMAN. Of course, you can deal with some of those by VAFE, but then VAFE has other problems that make it politically unacceptable. And you cannot demonstrate a fuel improvement.

And whereas we can theoretically demonstrate one under CAFE standards, it may not work out that way in practice. But at least you can theoretically demonstrate it, but it is hard to demonstrate that on VAFE unless you make the assumption that people will not move between size models.

Well, we have a lot of work yet to do. A lot of questions yet to be answered as you all can see and we want to solicit from each of you further information. You know, we are going to have to make some of these value judgments here. We have got to try to predict what the behavior of the consumer will be, because that is part of this.

We have got to try to predict what is unknowable and that is what kind of technological improvements can be made as yet either uninvented or untested or not in use now. Two-stroke engine, is it reliable? Will it last a long time? Will it meet fuel-efficient emissions tests—all of those things we have got to make a series of value judgments.

And we want to make that consistent with American jobs, the American economy. And within those constraints save as much gasoline as we can.

All right, the record will be closed in 2 weeks so we would solicit from all of you further written responses. Thank you very much. It has been an excellent panel.

[Whereupon, at 12:48 p.m., the hearing was adjourned.]

[Subsequent to the hearing the committee received the following:]

AMERICAN INTERNATIONAL AUTOMOBILE DEALERS ASSOCIATION
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STATEMENT OF THE
AMERICAN INTERNATIONAL AUTOMOBILE DEALERS ASSOCIATION
TO THE U.S. SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
CONCERNING S.341, THE "NATIONAL ENERGY SECURITY ACT OF 1991"

The American International Automobile Dealers Association represents the more than 9,700 franchised new car and truck dealers who market international automobiles in the United States. Our members and their 240,000 employees sell and service imported cars and trucks in the United States, as well as vehicles produced domestically by their international automobile manufacturers. We appreciate this opportunity to address the Committee on our views of S.341, specifically the language pertaining to the "Motor Vehicle Fuel Efficiency Act of 1991" in Title XI of the bill.

S.341 would direct the Secretary of Transportation to adopt new corporate average fuel economy (CAFE) standards. The Secretary would determine the percentage increase in the Model Year (MY) 1990 CAFE necessary to achieve the maximum feasible CAFE for each class of vehicles (e.g., passenger cars, light-duty trucks) for two periods, MYs 1996-2001 and MYs 2002 and beyond. In determining the percentage increase for each class of vehicles, the Secretary would consider various factors, including fuel-saving technology, MY 1990 performance levels, size mix and interior volume, and emission and safety standards. S.341 also contains language pertaining to credit trading, an excessive consumption fee and scrappage programs.

One of the stated intents of S.341 is to reduce U.S. dependence on foreign oil. We believe that this is a laudable goal and that it should be addressed in a manner that is both cost-effective and comprehensive. While we believe that the present CAFE regulatory system is inefficient and easily manipulated, we do not oppose legislation to increase automobile fuel efficiency. We are opposed to the language that directs the Secretary of Transportation to determine the percentage increase for each manufacturer. We believe that such manufacturer-specific language unfairly discriminates against international manufacturers and their dealers.

We believe that S.341 is a significant improvement over the CAFE bills that have been introduced to date in both houses of Congress. We support language that gives authority to the Secretary of Transportation to determine the potential for automobile fuel economy increases, and which directs the Secretary to consider important factors such as fuel-saving technology, emissions and safety standards, etc., in determining those increases. We also support a program to encourage scrappage of older, less fuel-efficient and more polluting vehicles.

We believe the percentage-based CAFE formula in S.341 has several flaws, which we discuss below. However, if the committee deems it necessary to increase CAFE and to enact changes in the current CAFE regulatory system, we would advocate a fuel economy regulatory system based on vehicle size class. In place of the bill's narrowly defined vehicle classes (e.g., passenger vehicle, light-duty trucks), the standards would be based on a uniform percentage increase in the base year average fuel economy for all vehicles in each EPA-defined size class (e.g., compact, subcompact). The size-class approach would provide for much more equitable treatment of manufacturers than the percentage-based approach, yet still apply pressure on manufacturers to increase automobile fuel economy.

I. Percentage-based CAFE standards would create a black market in corporate average fuel economy, and a potential franchise nightmare for retail automobile dealers in the U.S.

The current CAFE regulatory system has two standards, one that manufacturers must achieve in their "import" fleet and another that they must achieve in their "domestic" fleet. By establishing manufacturer-specific standards through a percentage-based formula, S.341 would create more than 40 different regulatory standards for the industry -- at least two standards (one for passenger cars and one for light-duty trucks) for each of the approximately 20 manufacturers/importers. In short, a percentage-based CAFE formula would create regulatory chaos. (See the attached excerpt from an *Automotive News* article for examples of how the current CAFE regulatory system creates a "puzzle" for manufacturers, which they must solve to comply with the standards.)

In an effort to meet higher CAFE standards, some manufacturers may choose to merge companies -- in effect merging fuel economy averages. Creative manipulation of the CAFE regulatory system to comply with "corporate average" fuel economy standards would not be new. Ford recently sourced more parts for its large cars (e.g., Crown Victoria) from Mexico to place them in Ford's "import" CAFE category and thereby lower its domestic fuel economy average.

Mergers of automobile companies are likely if manufacturers have difficulty meeting higher CAFE standards. A manufacturer with a low fuel economy average that would otherwise effectively be forced out of the U.S. market by higher CAFE standards would have little choice but to merge with another manufacturer with a higher fuel economy average to remain in the U.S. market. Mergers of this sort would have no positive effect on U.S. automobile fuel economy, but would create a franchising nightmare for dealers of these products.

Dealers are prevented by state franchising laws from owning a franchise within a specified geographic area of another franchisee of the same product. In the event that mergers do occur, a dealer who owns one or the other franchise could find that he or she no longer has the legal right to sell the resulting product in that area -- making his franchise worthless.

To sum, percentage-based standards would lead manufacturers to play more games with the CAFE system. The effect of this manipulation would be no net increase in U.S. automobile fuel efficiency and tremendous losses for retail automobile dealers who have significant, life-long investments in their franchises.

II. The percentage-based standards of S.341 penalize high fuel economy achievement while destroying future incentives.

International automobile manufacturers, as a group, have done the most to develop and successfully market fuel efficient automobiles, having been in the forefront of fuel economy research and development. They have introduced turbochargers and superchargers, to provide additional horsepower for small engines without increasing fuel consumption. And they have developed multi-valve technology, providing improved fuel economy with greater horsepower. Full-line Japanese manufacturers all have CAFE levels in the low 30s, as compared to domestic companies which will barely meet the minimum standard of 27.5 miles per gallon for 1991.

With percentage increases instead of flat, numerical increases in CAFE, this bill penalizes those who have invested the most in fuel economy technology and have subsequently achieved the highest fleet averages, well above that required by the present CAFE standard. It demands the least from the largest segment of the market (domestically-manufactured vehicles comprise approximately 70 percent of the U.S. automobile market), while making disproportionate demands on a relatively small market segment that has led the industry in attaining superior fuel economy standards.

The use of percentage-based CAFE increases clearly sends a message to manufacturers, domestic and international, which is counterproductive to future improvements in fuel economy technology: Exceed the standard and the United States government will make your compliance even more difficult in the future. And this message could spread well beyond just the automotive industry. S.341 could set a precedent for all industries facing the prospect of government regulation. Furthermore, this legislation would have the unintended effect of stifling the creative genius that may some day help solve future pollution and fuel economy problems.

Because of the disproportionate effect that percentage increases in CAFE (versus numerical increases) will have on the various manufacturers, dealers of international automobiles could be restricted to a limited class of vehicles. Japanese and European manufacturers could effectively be forced out of the mid-sized and luxury automobile markets. Potential customers would simply look elsewhere (likely to less fuel-efficient, domestic autos) for vehicles with more power and interior space, defeating the original intent of this legislation. This will unfairly, and without basis, put international automobile dealers at a competitive disadvantage. Some limited-line manufacturers could even be shut out of the U.S. market completely.

III. S.341 would unfairly discriminate against imports and violate GATT.

A percentile CAFE increase would constitute a blatant non-tariff barrier, since it would establish discriminatory and far more stringent fuel economy standards for international vehicles than it would for domestically-produced automobiles.

The major international automobile manufacturers presently maintain higher fuel economy standards by employing most, if not all, available technologies. The opportunity for large improvement in their fuel economies, therefore, is severely limited in comparison to the domestic manufacturers who do not employ all existing technologies. Furthermore, percentage increases would require these manufacturers, who have consistently provided fuel-efficient vehicles, to numerically increase their fuel economies more than the domestic manufacturers.

The proposed percentile increase would violate the international obligations of the United States under the General Agreement on Tariffs and Trade (GATT). Article II (4) of the GATT provides that national treatment should be provided for all requirements affecting the internal sale of products. The percentage-based formula, however, would have the effect of discriminating against international automobiles and would deny national treatment. Furthermore, the Agreement on Technical Barriers to Trade signed by the United States in 1979 requires that the United States not impose standards on technical regulations which have the effect of creating unnecessary obstacles to trade, which the proposed CAFE standard would do. With the percentage-based approach, the CAFE language in S.341 is discriminatory, denies national treatment, and would be import-limiting in effect.

Driving the European and Japanese manufacturers out of the mid-size and luxury car markets would be very expensive for the American consumer and would fuel inflation. Domestic manufacturers, free of price competition in those markets, would predictably raise prices on their mid-size and luxury models. The additional costs to consumers, sure to result from this legislation, could be as great as the expense of the Japanese voluntary restraint agreement, which costs U.S. car buyers as much as $12 billion each year.

IV. Any change in the present CAFE standard MUST BE FAIR TO ALL.

A. Any change in the present CAFE standard must be based upon that standard, not on the individual level of performance that has been achieved by the various manufacturers. Percentage-based CAFE standards penalize the most responsible manufacturers without fulfilling the intent of the legislation. As it stands, the CAFE language in S.341 is fundamentally biased.

B. Congress should not mandate solutions when free market answers are available. The free market has always provided the best solution to market issues (one example is the industry's response to the 1970s oil crisis) and it will continue to do so, if allowed. At the very minimum, manufacturers must be granted the opportunity to use alternative methods other than CAFE to achieve the goals of this legislation.

C. Finally, and very importantly, this legislation must include an exemption for limited-line manufacturers who sell less than 100,000 units annually in the United States. Percentage-based CAFE increases could destroy dealers of those limited lines while having a trivial impact on fuel conservation. At a time when the U.S. is striving to keep European markets open as the European Community (E.C) moves closer to economic integration, such a blatant restriction of the U.S. automotive market would only serve to damage U.S. interests in the E.C. These manufacturers should be given a free-market incentive to produce more fuel-efficient vehicles that are realistically within their manufacturing and marketing capabilities.

* * * * * *

We thank the Subcommittee for this opportunity to express our views on S.341 and look forward to working with the Committee to develop legislation that will responsibly and equitably address the genuine concerns presented by U.S. dependence on foreign oil.

Automotive News®

March 4, 1991

DOUBLE-EDGED SWORD

Japanese transplants being pushed to add more local content, but 'Americanization' of vehicles adds risk of CAFE penalties

By Lindsay Chappell
AUTOMOTIVE NEWS STAFF REPORTER

Japanese transplant automakers are finding the search for North American content is getting harder, despite strong gains last year.

Half of the 16 different cars and trucks currently built at North American transplant factories increased their domestic content levels last year. Of those that did, the average gain was 11.4 percent.

The increase was small comfort for some U.S. parts makers, who say the Japanese are dragging their feet in buying U.S. parts for transplants and for use back in Japan. American critics point out that a gaping $10.5 billion parts-trade imbalance still exists between the two nations.

But while the Japanese scurry to speed up their efforts under intensifying political pressures, they continue to face a double obstacle in their efforts:

- U.S. parts makers continue to fall below the quality standards that the Japanese say they are accustomed to, some claim
- By increasing their domestic content above the 75 percent level, some transplants could create, in the eyes of the U.S. government, a new class of vehicles that could throw them into non-compliance with corporate average fuel economy rules

[TEXT]

The CAFE puzzle

CAFE is becoming a stumbling mark to higher North American content as transplant makers approach the 75 percent mark.

New congressional proposals could force automakers to increase their scores by 40 percent within the next decade. That could be bad news for the transplants, who build a number of larger, less fuel-efficient vehicles here, including the Honda Accord sedan and station wagon, the Toyota Camry and the Isuzu Rodeo.

It could also be bad news for American parts makers, since domestic content will determine how those cars are counted by the EPA.

Under CAFE rules, once an entire car or truck model averages 75 percent domestic content — including those units built in Japan — it becomes an automaker's "domestic" fleet. As such, it is not averaged with the cars in the "import" fleet, which tend to have better mileage ratings. Each fleet must meet the EPA's current 27.5-mile-per-gallon standard or face penalties.

As the Japanese shift more production to North America and the domestic content levels begin to tip some cars out of the import fleets, the transplants could be faced with the challenge of making large gains in fuel-economy ratings or paying the penalty.

CAFE worries have already caused Nissan Motor Co. to slow down its domestic-sourcing push. Officials there said in January that the company will hold its Tennessee-built Sentra below the 75 percent domestic mark to avoid the issue.

Nissan's total fleet averaged 30.8 mpg in 1988, and the Sentra averages safely in the range of 26 to 36 mpg. But a new vehicle the company plans to build in Tennessee starting in 1992 will be based on the Stanza replacement, which averages between 21 and 29 mpg.

Equally problematic, should the Sentra fall out of Nissan's imports, that fleet could find it more difficult to meet rising CAFE requirements — especially if sales of Nissan's big-engine Infiniti line push up the fleet average.

A spokeswoman for Nissan Motor Manufacturing Corp. U.S.A. in Smyrna, Tenn., maintained that "Nissan will continue working to source more componentry from local suppliers" but said the company is studying the CAFE issue closely.

Toyota executives also admit they are unsure where their current U.S. production policy will lead them in CAFE terms. Toyota surprised the industry late last year by

(continued)

(continued from page 1)

announcing it will double production of Camrys in the United States to about 450,000 units a year by the mid-1990s. The company's planned $800-million expansion in Kentucky will mean that all Camrys will be produced domestically. That will happen almost at the same time that aggressive U.S parts sourcing results in the Camry being re-classified as a domestic product by the EPA.

Because the Camry currently averages in the range of 21 to 27 mpg, the shift could present Toyota with a compliance challenge. To intensify the situation, Toyota also plans to begin building the heavier Camry wagon domestically.

"It's a question we really don't have an answer for yet," said Tim Andree, a spokesman for the carmaker's North American headquarters in New York. "We're obviously not going to stop our sourcing at 74 percent. But we're not sure what the CAFE implications will be for us."

A possible solution may lie in its American production mix. Toyota's co-owned New United Motors Manufacturing Inc. recently announced that the Fremont, Calif.-built Corolla had reached the 75 percent level. A North American Content-Increase Program at NUMMI resulted in the sourcing of 300 new parts numbers from domestic suppliers. (A NUMMI spokesman later modified the statement, stating that "we're now saying that the number is somewhere between 70 and 75 percent.")

Despite the gain, the fuel-efficient Corolla remains classified as an import because the U.S. models are combined with those still imported from Japan. That's beneficial to Toyota, whose import fleet has dropped in overall CAFE efficiency as a result of new Lexus Division sales.

On the other hand, by making the Corolla a domestic product, Toyota could offset the Camry's reclassification, if the two cars are averaged together for one domestic-fleet CAFE rating.

Other transplant vehicles that could face a showdown on the CAFE issue are:

● The Honda Accord — particularly the heavier station wagon version, which will be judged as a separate model for CAFE purposes, according to the EPA. The sedan and coupe version reached the 75 percent domestic level this year, although enough lower-content Accords are still coming in from Japan to keep the model average under the domestic Level. The wagon is produced exclusively in the United States and is expected to reach the 75 percent level during the 1991 model year. The Accord now averages 24 to 28 mpg.

● The Isuzu Rodeo, a sport-utility built exclusively in Lafayette, Ind., with a fuel rating of 16 to 19 mpg this year. The CAFE standard for light trucks is 20.2 mpg.

● The Honda Civic, which is expected to reach the 75 percent level after its 1992 remodeling. Because of the Civic's high fuel efficiency, its potential loss from Honda's import column could knock that fleet down a notch. Or, similar to Toyota's situation with the Camry and Corolla, a domestic Civic could help balance out the domestic Accord.

The New York Times

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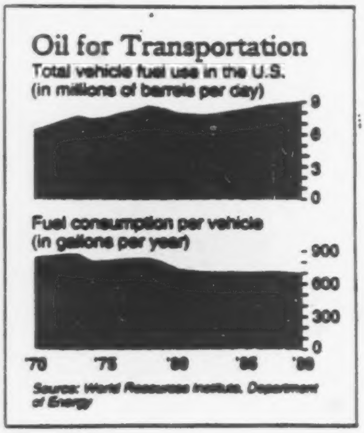
Save Gasoline a Better Way

The best way to reduce the use of fuel and clean up the atmosphere is for Congress to pass a stiff energy tax. But the Administration's national energy strategy virtually ignores tax hikes or any other conservation measure, an omission that many in Congress rightly want to reverse.

Yet Congress, too, seems determined to duck taxes. Senator Richard Bryan of Wisconsin has won considerable support for a different approach, a bill that would raise average fuel-efficiency standards for new cars from 27.5 miles per gallon to 40. Mr. Bryan's regulatory approach is tempting, but it won't work as well as higher taxes. That's because fuel-efficiency standards — known as CAFE standards — lower only fuel use *per vehicle* for new cars. But CAFE has not significantly lowered *total* fuel use. In recent years, fuel use per vehicle has gone down, and total fuel use has gone up.



Oil for Transportation

Source: World Resources Institute, Department of Energy

Compared with a tax, CAFE standards affect a much smaller segment of the energy market. They apply only to new cars, which account for less than 10 percent of gasoline consumption. Worse yet, they hold down driving costs. And Congress treats CAFE as a substitute for a stiff gasoline tax, keeping gas prices down.

These lower driving costs encourage people to drive more miles, which offsets part of the impact of higher fuel economy. CAFE also works against itself in another way. Manufacturers may be forced to adopt expensive technologies, making new cars more expensive, encouraging drivers to keep old gas-guzzlers.

Safety is also a serious issue. To meet CAFE, manufacturers sell smaller cars. According to studies by Robert Crandall of the Brookings Institution, 1989 cars were 500 pounds lighter than they would have been without CAFE. That will boost fatalities in these cars by about 2,500 and serious injuries by 25,000. True, higher gas taxes would also make small cars more attractive, but less so. Taxes primarily encourage everyone to drive less.

Over all, the fuel savings generated by CAFE standards are small, according to studies by Prof. Robert Leone of Boston University. Energy taxes would be more effective. A higher gas tax would encourage everyone to drive less, buy more fuel-efficient cars, share rides and, eventually, live closer to work. According to some studies, a gasoline tax as small as 5 cents per gallon would achieve as much conservation as Mr. Bryan's bill, but at a fraction of the cost to the economy. A broad tax applying to all fossil fuels would fight pollution and global warming even better.

Congress, fearful of voter wrath over tax increases, could offset a higher gas tax with lower payroll taxes. That way the Federal deficit would be unaffected, one regressive tax would replace another and the nation's needs for energy, and clean air, would be protected. That's the core of a sensible national energy strategy.

3/16/91 Washington Post

Better Mileage and the Sacrifice of Safety

Like the medieval alchemists who convinced people they could turn ordinary metal into gold, along comes Jessica Mathews of the World Resources Institute to tell us that we can legislate sharp increases in auto fuel economy without a major safety trade-off ["High Mileage and the Safety Excuse," op-ed, March 8].

No shortcuts, however, will enable Americans to drive the cars they want and need, keep the air clean and burn 40 percent less fuel without safety, comfort and utility trade-offs. And most consumers would be stunned by the "socially responsible" puddle-jumpers that Mathews would have them drive. Such cars have been available from domestic and foreign manufacturers for many years, but most people need larger cars and like the idea of being surrounded by more sheet metal.

The Bush administration strongly opposes the bill to increase Corporate Average Fuel Economy—proposed by Sen. Richard Bryan (D-Nev.) and endorsed by Mathews—not because it would increase fuel economy, but because it would decrease safety, harm U.S. competitiveness, put U.S. workers out of jobs and curtail consumer choice in the car marketplace.

Everyone wants better fuel economy, cleaner air and more safety. But no legitimate engineer would agree with Mathews' contention that "neither reducing weight nor reducing size necessarily makes a car less safe."

Take two cars, one small and one large, equip them with identical safety equipment and then crash them into each other. The larger car comes out best, because its larger mass forces the small car to absorb a disproportionate share of the crash energy.

Yes, you can add more safety equipment to the small car to beef up protection for its occupants. But if you gave the same added protection to occupants in the larger car, they would be even safer. Further, reduced weight, shorter wheelbase and narrower track width make smaller cars more difficult to keep on the road in emergency maneuvers. And once off the road, they are more likely to roll, which again increases the risk of fatal injury.

Mathews alleged that new fuel-saving technologies are on a back shelf somewhere in Detroit. But what car company would hold back technologies that would make its products more competitive without the need to downsize? And if the Japanese or Europeans knew of such technology, why would they not introduce it in their marketplaces where gas costs several dollars a gallon?

The truth about CAFE is that the drastic fuel economy increases that have been proposed by Bryan can be achieved only by downsizing. The bottom line is drastically smaller cars and more injuries and deaths.

Fortunately, measures are available that can produce energy savings in cars while not forcing unnecessary or unwelcome safety and economic costs onto the public. Approaches grounded in market incentives, instead of fiats from Washington, can be flexible solutions to addressing safety, energy and environmental concerns related to fossil fuel use. Our position puts safety first in the list of concerns. Mathews' position does not.

—*Jerry Ralph Curry*

The writer is administrator of the National Highway Traffic Safety Administration.

■

Jessica Mathews is no expert on motor vehicle safety. In her column on fuel efficiency, she said that "safety is primarily a matter of design and secondarily a matter of size or weight." That's untrue. The death rate in the smallest cars on the road is more than double the rate in the largest cars. This is true in both single- and multiple-vehicle crashes, and the effects of car size hold regardless of driver age.

Mathews also said that "the safety bonus from air bags swamps the most pessimistic projections of increased fatalities from smaller cars." Wrong again.

The combination of an air bag and a lap-shoulder safety belt is the best occupant protection system yet developed, but air bags cannot make up for the adverse safety effects of smaller cars. In a recent test conducted by the Insurance Institute for Highway Safety, a big car and a little one—both equipped with air bags and each traveling at 35 mph—were subjected to an impact on the driver sides. The smaller car's occupant compartment was severely intruded, while the larger car's was intact. In a real-world crash, we would expect serious or fatal injuries to the driver of the small car but relatively minor injuries to the driver of the larger car.

Mathews further cited a declining mileage death rate in recent years as proof that smaller cars aren't more dangerous than larger ones. But this rate includes all kinds of deaths—motorcyclist, bicyclist, pedestrian and other categories—that have nothing to do with car occupants. The decline in the mileage death rate has been largely due to declines in these other deaths, particularly motorcyclist deaths, which are down 25 percent since 1983.

The correct statistic to use is the motor vehicle occupant death rate before and after downsizing. These statistics show that death rates are higher for 10 of 11 General Motors car types that were downsized between the 1977 and 1986 model years. General Motors cars that weren't downsized show no such pattern of increased death rates.

Mathews claimed that tougher fuel economy standards can be met without further downsizing, citing "a raft of studies" that show "a long list of technological improvements" that could be used to improve auto fuel efficiency without downsizing. The problem is, these technologies don't accomplish anything like the improvement she claims. Steven E. Plotkin of the Office of Technology Assessment—which uses the same consultant that Mathews cited to make her case—recently told a U.S. Senate committee that automakers "would have a great deal of difficulty meeting the 1996 [fuel economy] standard" proposed in Bryan's bill, which Mathews supports. He went on to note that automakers would try to comply, first of all, by selling smaller cars.

Under the Bryan bill, each manufacturer would have to improve its 1988 model year average fuel economy by 20 percent by 1996, 40 percent by 2001. Honda—an automaker not known for gas guzzlers—illustrates what this would mean for automakers. In its model year of 1988, Honda's sales mix included 27 percent Civics, 45 percent Accords, 9 percent Preludes, 9 percent Integras and 10 percent Legends. If Honda were to meet Bryan's standard in 1996, without technological improvements, it would have to sell only Accords and Civics—and the mix would have to be 95 percent Civics and 5 percent Accords.

The bottom line is that we don't want to trade people's lives for oil. We need improvements in both safety and fuel economy. We should see how far we can get toward the latter without risking the former.

—*Brian O'Neill*

The writer is president of the Insurance Institute for Highway Safety.

CAPITOL COMMENT

No. 71
March 18, 1991

A TIMELY PERSPECTIVE ON CURRENT PUBLIC POLICY.

CAFE NOT THE ROAD TO ENERGY INDEPENDENCE

Sen. Richard Bryan (D-NV) has introduced a bill, S. 279, mandating higher auto fuel efficiency standards, arguing that greater fuel efficiency will reduce U.S. dependence on foreign oil. "Before the Iraqi invasion of Kuwait, we imported 730,000 barrels of oil per day from Iraq and Kuwait combined," he said. "In the first six years alone, [the bill] will save more than 48 billion gallons of gasoline. This kind of conservation means less dependence on foreign oil...."

At first glance the argument seems to make sense, but 13 years of experience with auto fuel efficiency standards suggest no simple connection between such standards and oil dependency. Passing S. 279 will not reduce dependence on foreign oil.

In 1975, when Congress enacted Corporate Average Fuel Economy (CAFE) standards, we imported 35.8 percent of our oil. In 1978, when the original standard of 18 mpg was imposed, we imported 42.5 percent of our oil. Last year the CAFE standard was set at 27.5 mpg; we imported 45 percent of our oil. Increasing CAFE standards more than 50 percent over the last 13 years has not brought us any closer to energy independence. Why then should we expect CAFE standards to work differently in the future?

If anything, these numbers suggest that higher CAFE standards increase our dependence on imported oil, although that's not quite right either. Oil imports have varied considerably over the last two decades. In 1977, we imported a record 46.5 percent of our oil supply; by 1985, imports had fallen to 27.3 percent of supply. Since 1985 the percentage of imported oil has increased steadily. It's not simply that higher CAFE standards lead to either a greater or lesser dependence on imported oil, but rather CAFE standards just do not seem to have much effect on the percentage of oil we import.

Changes in oil prices explain most of the variation in the percentage imported. When OPEC and other exporters sell oil cheaply we import more, when prices rise we import less. It's all part of the normal functioning of international energy markets.

In this context, the Bryan bill may actually slightly increase U.S. oil dependence. A decline in U.S. consumption would tend to push oil prices down. As prices fall, oil suppliers cut back production. High-cost suppliers would shut down first because their prices no longer justify production. Low-cost suppliers, on the other hand, can afford to stay in the market even at lower prices.

Citizens for a Sound Economy 470 L'Enfant Plaza SW East Building #7112 Washington D.C. 20024 (202) 488-8200

Some of the cheapest oil in the world is produced in the Middle East. While it costs the Saudis $2 to $3 per barrel to produce oil, it costs some domestic producers $15 or more. As oil prices fall, domestic production may be the first to shut down, meaning we may become even more dependent on foreign oil.

Recent experience tends to bear this out. The relatively high oil prices of the early 1980s saw oil dependence fall from 43.1 percent in 1979 to 27.3 percent in 1985. When the OPEC cartel collapsed in late 1985, causing a plunge in oil prices, U.S. import dependency began increasing again. Since 1985, the five years of relatively lower world oil prices has helped lead us to import a near record 45 percent of our consumption.

Understanding oil markets in this way shows the error of the naive approach to energy independence that often appears in public debate. Since we import 45 percent of our oil, some suggest cutting consumption that much would make us energy independent. Actually, the opposite could happen. Lower prices due to lower consumption would tend to drive higher-cost American oil producers out of the market, leaving lower-cost producers from the Middle East and elsewhere to obtain an even larger share of the world oil market.

Unfortunately, arguments linking fuel efficiency with reduced dependency on foreign oil seem to have persuaded many in Congress to support the Bryan bill. If they do so, they will compound a lack of understanding by passing a bad bill.

Consumers want fuel efficient cars, but they also want useful, inexpensive, and convenient cars. CAFE standards force consumers to choose more fuel efficient cars at the expense of other desirable features.

In particular, the smaller, lighter cars that automakers would have to produce to meet Bryan's CAFE standards may be less safe than the larger cars consumers would otherwise drive. Robert Crandall of the Brookings Institution and Harvard's John D. Graham have estimated that the CAFE standard of 27 mpg for 1989 will cause up to 3,900 additional accidental deaths in cars produced during that year alone.

When he introduced S. 279 on January 28th, Sen. Bryan said, "There is no better argument for reducing our dependence on foreign oil than the news reports from the Persian Gulf." But the desire to reduce our dependence on foreign oil should not be used to advocate higher CAFE standards, because they won't accomplish that mission.

Michael Giberson
Policy Analyst

Coalition
For Vehicle
Choice

Jeffrey B. Conley
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SENIOR CONGRESSIONAL & ADMINISTRATION LEADERS CRITICIZE LEGISLATION TO INCREASE VEHICLE FUEL ECONOMY

Washington, D.C., March 20 -- Congressional leaders and a senior administration official expressed their concerns today about legislation calling for dramatically higher vehicle fuel economy standards to an organizational meeting of the Coalition for Vehicle Choice (CVC).

The Coalition consists of more than seventy national and state organizations representing businesses, agricultural interests, consumer and citizen groups concerned about the impact of substantially higher fuel economy requirements.

"I am concerned that proposals to dramatically increase Corporate Average Fuel Economy (CAFE) standards would increase the cost of new cars and light trucks, limit the choice of cars to mostly small and lighter models and seriously compromise motorists' safety," said Congressman John Dingell (D-MI), chairman of the House Energy and Commerce Committee, in his remarks kicking off the meeting.

A Senate bill, sponsored by Senator Richard Bryan (D-NV), would require each vehicle manufacturer to boost its new car and light truck mileage by 20 percent by 1996

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and 40 percent by 2001. This means that most new cars would have to average about 33 miles per gallon by 1996 and 40 mpg by 2001.

Senator Don Nickles (R-OK), a member of the Senate Energy and Natural Resources Committee, pointed out that such legislation is not just a concern of the auto industry, but of all Americans. "Families, people with special disabilities and those who prefer the safety of full-size vehicles will hang onto their older, less fuel-efficient models if they can't find new ones that meet their needs. Proponents of this kind of legislation also are ignoring farmers and tradesmen who need adequately powered pick-up trucks and vans to earn a living."

The Administrator of the National Highway Traffic Safety Administration, Jerry Ralph Curry, during his luncheon speech, said the Bryan bill would degrade highway safety. "The chain of events leading to a 40 mile per gallon fleet CAFE rating must include significant downsizing of the automobile. Downsizing is to safety what a fox is to a chicken: A real hazard."

Bills calling for dramatically higher CAFE standards also have been introduced in the House of Representatives. Supporters of higher CAFE standards have been pushing them as the solution to U.S. dependence on imported oil.

According to Administrator Curry, that argument is false. "Despite a virtual doubling of passenger car fuel economy between the mid-seventies and late-eighties, our foreign oil consumption increased because fuel efficiency standards lower only the per vehicle fuel use by new cars," Curry said.

"While fuel use per car has gone down, total fuel use in the United States has gone up. That's not conservation. That's using a dinner spoon to bail water out of a sinking ship. CAFE is irrelevant...emphatically not the way to go."

CVC members include automobile manufacturers and dealers, the American Farm Bureau Federation, National Association of Chiefs of Police, American Recreation Coalition, Consumer Alert, National Grange, National Motorists Association, Independent Electrical Contractors and National Roofing Contractors Association.

Other groups opposed to legislation like Senator Bryan's include the United Auto Workers and the Insurance Institute for Highway Safety.

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March 14, 1991

The Honorable J. Bennett Johnston
Chairman
Senate Committee on Energy & Natural Resources
Washington, D.C. 20510-6150

Dear Mr. Chairman:

Enclosed are the comments of Nissan North America, Inc. on the Corporate Average Fuel Economy (CAFE) provisions of Title XI of your comprehensive energy legislation, S. 341. We request that this statement be entered as an official part of the hearing record .

Nissan applauds your efforts to develop a comprehensive energy bill, and to provide a means for careful evaluation of the potential for improving fuel economy. Indeed, we will support government efforts to establish fuel economy requirements that meet certain key criteria, and S. 341 goes far in that direction. However, insofar as S. 341 requires different fuel economy standards for each manufacturer, we are strongly opposed to it.

At the February 25 Committee hearing on this subject, we were encouraged to hear of your interest in considering an alternative to manufacturer-specific "percentage increase" fuel economy standards based on vehicle size. We would urge you to pursue such an alternative, which avoids anti-competitive effects and other numerous pitfalls of the percentage increase approach. We are fully prepared to work with the Committee in developing an alternative that is based on standards for size classes/ market segments of vehicles.

Please contact me if you have questions regarding the enclosed, or if we can be of assistance.

Sincerely,

Timothy MacCarthy

Timothy C. MacCarthy
Director, Government & Industry Affairs

encl/

STATEMENT OF NISSAN NORTH AMERICA, INC.
TO THE
SENATE ENERGY & NATURAL RESOURCES COMMITTEE
ON
TITLE XI, SUBTITLE A OF S. 341,
THE NATIONAL ENERGY SECURITY ACT OF 1991

EXECUTIVE SUMMARY

Nissan supports the goal of improving the fuel efficiency of the nation's automotive fleet. Energy conservation makes good sense from both energy security and environmental viewpoints. A more efficient motor vehicle fleet should play an important role in a comprehensive national energy policy.

Nissan will support government efforts, as part of a comprehensive national energy policy, to establish new fuel efficiency standards for motor vehicles that meet the following criteria: actually reduce energy consumption and carbon dioxide emissions; be technologically feasible and cost-effective, and provide adequate lead time to comply; promote the adoption of fuel efficient technologies and weight reduction by all manufacturers; avoid anti-competitive effects; and allow manufacturers to meet consumer needs and other regulatory demands.

S. 341 meets some but not all of these criteria. Most importantly, S. 341 would set different standards for different manufacturers and thereby trigger severe anti-competitive consequences that would render the legislation self-defeating. We urge the Committee to abandon the "percentage increase" approach and to embrace instead an approach that would set standards for each market segment class of vehicles. Nissan is willing to work with the Committee in refining this approach or any alternative approach that meets our criteria.

Part I of Nissan's statement addresses the merits and drawbacks of the CAFE provisions of S. 341. Part II responds to the the issues laid out by the Committee that individuals preparing statements were requested to address.

INTRODUCTION

Nissan North America, Inc. is a wholly-owned subsidiary of Nissan Motor Company, Ltd. of Japan, the world's fourth largest producer of motor vehicles. We are a company well on its way to becoming a fully integrated U.S. manufacturer. We employ nearly 5,500 people in our U.S. manufacturing operations and we will soon have capacity to produce 450,000 vehicles annually in the United States. Total employment by other Nissan subsidiaries in the United States will reach more than 11,000 by the mid-1990's, including those employed in vehicle design and engineering, sales and marketing. 1,200 Nissan dealers throughout the country currently employ over 47,000 more people. Simply put, Nissan has made a major commitment to the U.S. market. Thus we appreciate this opportunity to provide our views on the Corporate Average Fuel Economy (CAFE) subtitle of S. 341, Senator Johnston's comprehensive energy policy legislation.

Nissan is strongly committed to improving fuel economy. Our objective is to build high quality, fuel efficient vehicles that offer consumers an excellent value for their automotive dollar. Nissan has exceeded CAFE standards every year for both our car and light truck fleets. Our passenger car CAFE in 1991 is projected to exceed our 1990 CAFE level, and our light truck CAFE is the highest of any major automotive manufacturer. We have never sought to reduce or repeal the standards. And we have never used any of the CAFE credits we have earned by exceeding the standards.

Nissan will support government efforts to establish fuel economy standards that meet certain key criteria and thus qualify as a responsible approach to regulating automotive fuel efficiency. Any new standards must be part of a comprehensive national energy policy that takes into account the realities of the market. Also, new standards should:

- actually reduce energy consumption and carbon dioxide emissions;
- be technologically feasible and cost-effective, and provide manufacturers adequate lead time to comply;
- promote the development and adoption of fuel efficient technologies and weight reduction by all manufacturers;
- avoid anti-competitive effects; and

- allow manufacturers sufficient flexibility to meet consumer needs and comply with competing regulatory requirements.

S. 341 does a better job of meeting some of these criteria than S. 279, "The Motor Vehicle Fuel Efficiency Act." However, S. 341 embodies the same anti-competitive, fundamentally flawed approach as S. 279, that of setting different standards for different manufacturers. Nissan strongly opposes this approach, and thus cannot support S. 341 in its present form.

Senator Johnston, in his introductory remarks on S. 341, stated that "all CAFE options should be on the table." Therefore we urge the Committee to abandon the "percentage increase" method, and to give full consideration to an alternative based on standards for each size or market segment class of vehicles, which avoids these anti-competitive effects.

PART I. NISSAN'S VIEWS ON THE CAFE PROVISIONS OF S. 341

A. S. 341 HAS SEVERAL COMMENDABLE FEATURES

We applaud the Energy Committee for adopting a comprehensive approach to energy policy. We also applaud the Committee for incorporating the following elements into its CAFE program:

- Requiring a careful technical analysis of maximum feasible potential for improving fuel economy in determining the appropriate level of new standards.
- Considering separately passenger car and light truck fuel economy improvement potential.
- Using the most recent complete model year (1990) performance levels, size mix and interior volume, which best represents current consumer preferences and manufacturers' present model lineups. (In this regard, S. 341 is clearly preferable to S. 279, which relies on 1988 as a baseline.)
- Taking into account the industry's need to meet applicable emission control and safety standards.

- Permitting an expanded credit trading program, which gives manufacturers greater flexibility to meet the needs of consumers, while the fleet as a whole is still required to meet the overall fuel efficiency target.

HOWEVER, BY SETTING DIFFERENT STANDARDS FOR EACH MANUFACTURER, S. 341 EMBRACES A FATALLY FLAWED APPROACH TO FUEL ECONOMY REGULATION

The most serious flaw in S. 341 is the way it would regulate fuel economy in the future, by setting different standards for each manufacturer. From that basic error flows the undesirable consequences of S. 341: its anti-competitive effects and its inability to achieve the very energy savings it seeks.

1. Setting Different Standards for Each Manufacturer is a Fundamentally Flawed Approach to Government Regulation.

Setting different standards for each manufacturer would be a radical departure from every other federal regulatory program. Such an approach would "punish" superior performance by assigning ever-more stringent standards to superior performing companies, even when that performance reflects a more aggressive use of advanced technologies. And it would "reward" lower performance by setting easier standards for those companies producing less fuel-efficient fleets.

The flaw in this regulatory philosophy becomes apparent when its consequences are considered. Depending on the ultimate standard, Nissan could be penalized for achieving a CAFE 10 mpg above another manufacturer, while the other manufacturer could be rewarded (that is, could be earning credits).

2. Setting Different Standards for Each Manufacturer Will Have Significant Anti-Competitive Consequences, Particularly for Manufacturers With a High Rate of Use of Advanced Technology.

Nissan and other high mileage manufacturers have higher levels of average fuel economy in part due to differences in size mix, but also due to a higher rate of use of advanced fuel-saving technologies. (See Attachment 1.) The Office of Technology Assessment (OTA) pointed out the anti-competitive effects uniform percentage increase standards have on high-mileage manufacturers, in a statement to the Commerce Committee hearing record on S. 1224, in the 101st Congress (S. Hrg. 101-347):

> "the proposed structure may be vulnerable to claims that it is **inequitable and unfair.** The structure does not account for the fact that **at least a portion of the current differences in companies' CAFEs are due to ... the companies' different efforts at moving advanced technology into their fleets**. Our analysis of the fuel economy characteristics of various company fleets ... indicates that some companies have fleet fuel economies that are well above the industry average even when the effects of fleet size distribution are accounted for. Thus, this type of standard **penalizes manufacturers who have tried the hardest to increase their fleet fuel efficiency in the past**. They now have the most difficult technological challenge, because they have already "used up" a larger portion of the technological headroom available to them from off-the-shelf technology. Companies that have hesitated to use the best available technologies ... are instead rewarded by being presented with the lowest efficiency target. Furthermore, there is the possibility that consumers may not place a high value on the increased levels of fuel efficiency, and thus may tend to prefer lower efficiency vehicles from the "favored" companies, because their price tags don't include the costs of the most advanced technologies. Also, it is possible that companies that wind up with the lowest efficiency targets could use the leeway these lower targets afford them to increase vehicle performance to levels that companies with higher efficiency targets may not be able to match (because higher performance reduces fuel efficiency). If either of the latter two outcomes occur, **we have not only rewarded the lower efficiency automakers with an easier target, but have given them a market advantage as well."** (Emphasis added.)

Even if S. 341 were to lead to adoption of lower "percentage increase" requirements than the 20% and 40% improvements called for in S. 279, the differential standards would still produce anti-competitive effects. Less stringent percentage increase standards could, in all likelihood, be met by lower mileage manufacturers simply by using the most cost-effective existing technologies that Nissan and other higher mileage companies are already using. They would not be forced to sacrifice vehicle size and performance to any significant extent. Because of its already high penetration of technology, Nissan, in all likelihood, would be forced to commercialize unproven technology to meet even less stringent standards, as well as downsize and reduce performance. Thus, lower targets would still make our cars more costly and less attractive than vehicles sold by lower mileage companies. Unrealistically stringent standards (such as in S. 279) would force every manufacturer, at least to some degree, to commercialize costly and unproven technology.

3. Setting Different Standards for Different Companies Will Not Achieve Intended Fuel Savings.

S. 341 can achieve its overall fleet fuel economy goal only if all higher mileage manufacturers retain their 1990 market share. The approach itself makes that very condition impossible, however. As a result, the fuel economy gains the bill seeks will not be realized.

The reasons why this approach is self-defeating are clear in the logic of OTA's submission to the Senate Commerce Committee, previously quoted. Giving a market advantage to lower mileage manufacturers would enable them to gain market share at the expense of higher mileage manufacturers. Lower mileage manufacturers could increase their utilization rates of fuel saving technologies already in use by higher mileage manufacturers, enabling them to meet the lower standards that apply to them without having to resort to downsizing and reducing vehicle performance. Higher fuel efficiency manufacturers, faced with more stringent standards, would be forced to embrace expensive, unproven technologies, to downsize, and to reduce performance.

In a very competitive marketplace, sales of vehicles that cost more, have reduced performance, and fail to meet consumer needs would lose out. More vehicles that are subject to less stringent standards would be sold, and fewer vehicles subject to more stringent standards will be sold. The result would be that the fuel savings anticipated by S. 341 would not materialize.

In addition, the uniform percentage increase approach, by failing to provide a mechanism for the equitable treatment of new market entrants, also creates substantial opportunities to defeat the energy savings target. For example, the uniform percentage increase could virtually eliminate higher mileage, light truck manufacturers from the light truck market (see point 4 below for a full explanation). This likelihood of product restrictions for current truck manufacturers would create significant sales opportunities for manufacturers that have the capability to produce trucks, but have not sold light trucks in the U.S. in recent years. "New" companies could enter the U.S. truck market relatively free of CAFE constraints, and with a significant competitive advantage. If the market shifts to towards manufacturers that can make less fuel-efficient products because they have a lower CAFE to meet, anticipated fuel savings would be substantially reduced.

A similar phenomenon might occur in the passenger car market. Lower fuel economy manufacturers could form joint ventures with higher mileage manufacturers, under which the lower mileage company would market vehicles produced by the higher mileage company. The lower mileage company's lower fuel economy standard would, in effect, become a saleable asset in such arrangements.

Again, these types of strategies would be quite natural responses to the percentage increase approach by companies in a highly competitive marketplace. No doubt other, even more imaginative, strategies would evolve. None would produce any real fuel economy benefits.

4. Setting Different Standards for Each Manufacturer Will Have Especially Severe Consequences in the Light Truck Market.

The fact that trucks carry payloads imposes certain design limitations. These limitations mean that the potential to improve the fuel efficiency of trucks is less than that for cars. For example, front wheel drive is an effective fuel saving technique for cars that is not suitable for trucks because a truck's drive wheels should be situated under its payload.

S. 341 recognizes the functional differences between passenger cars and light trucks by permitting separate evaluation of their fuel economy improvement potential. However, the uniform percentage increase approach does not take into account the essential difference between lower mileage and higher mileage light truck manufacturers: higher mileage makers offer only compact truck models while lower mileage makers sell both compact and full-size models.

To meet the same percentage increase as lower mileage companies, Nissan and other higher mileage manufacturers would be required to downsize their trucks.

This would put their trucks into a market segment that now does not exist. Lower mileage manufacturers, on the other hand, could apply fuel saving technologies already in use by higher mileage manufacturers and expand sales in the compact market segment that higher mileage companies would be forced to abandon. As a result, S. 341 could virtually eliminate the higher mileage manufacturers from the light truck market. Consumer choice could be restricted severely.

This point was made in a February 12, 1991 letter from DOE Deputy Secretary W. Henson Moore to House Energy & Commerce Committee Chairman Congressman John Dingell on S. 1224:

> "Downsizing or performance reductions will be necessary to achieve the levels of S. 1224, for cars and light trucks. This is a particular problem for light trucks where performance reductions are less feasible. **For import light truck manufacturers, downsizing is a very limited option** since their product lines contain few or no larger vehicles. **This may be the single most difficult-to-achieve requirement of S. 1224."** (Emphasis added.)

(For purposes of CAFE, "import light truck manufacturers" includes Nissan, even though a substantial portion of our U.S. light-truck fleet is produced in Tennessee.)

B. ALTERNATIVE APPROACHES CAN ACHIEVE ENERGY SAVINGS AND AVOID THE PITFALLS OF THE DIFFERENTIAL STANDARDS APPROACH.

Given the fatal flaws inherent in an approach that sets different standards for each manufacturer, the Committee should consider alternative approaches. Analysts in the Office of Technology Assessment have pointed to a preferable alternative: standards based on vehicle size or market segment classes that would treat manufacturers in a like manner regardless of the number of lines they offer or the product mix of their fleets.

The President's National Energy Strategy (NES) points in the same direction. The Executive Summary of the NES suggests that the Administration may consider establishing an alternative form of corporate average fuel economy standard once its comprehensive analysis of fuel economy is completed. The NES identifies standards based on vehicle size, not uniform percentage increase, as the alternative it is considering.

It is also worth noting that the National Academy of Sciences (NAS) study commissioned by the Department of Transportation on the potential for future fuel economy improvements focuses on the improvement potential by size classes of vehicles rather than for individual manufacturers. This study design was chosen to avoid anti-competitive conclusions.

Size or segment based standards meet each of the criteria we have outlined as constituting a responsible approach to regulating automotive fuel efficiency. The advantage of this approach is that vehicles would compete head-to-head in classes where the standards are directly related to the past performance in that class. There would be no discrimination among manufacturers and therefore no anti-competitive effects.

We are prepared to cooperate fully with the Energy Committee to further refine a size or segment based alternative concept. We propose that work proceed along the following principles:

- Standards would be set for the seven traditional market segment classes of passenger cars and six classes of non-passenger vehicles (light trucks, vans, and sport utility vehicles). (See Attachment 2.)
- Standards would be set using available data from the most recent year in which complete data is available (at present, 1990 MY). The average fuel economy for each market segment would be determined for the base year. Standards would be set by applying the same improvement task to each class. Consistent with S. 341, the improvement task could be determined by DOT on the basis of an analysis of average, industry-wide capability.
- Credits for exceeding the standards in any one market segment could be earned by a manufacturer and transferred to another market segment as well as to another manufacturer, similar to what is proposed in S. 341. This would give manufacturers flexibility to meet the needs of consumers while the fleet as a whole would still meet the overall fuel efficiency target.

We acknowledge that concerns have been raised that the market segment approach would permit unrestricted growth in the sale of larger vehicles, and thus cannot guarantee that energy savings would result. We believe these concerns are unwarranted. Nevertheless we are prepared to support the adoption of measures to complement the market segment approach to ensure the intended savings would be realized.

We believe the concerns are unwarranted primarily because of evidence that consumer demand for vehicle size is, on average, relatively constant. Data from the Oak Ridge National Laboratory shows that average interior volume of the nation's vehicle fleet has remained quite stable -- with a range of plus-or-minus two percent -- from 1977 to 1990. (See Attachment 3.) Considering the variation in circumstances over that period -- from no fuel economy standards to the current standards, through rising and falling gasoline prices, through oil embargoes, through economic downturns and upturns -- this stability is remarkable. It suggests consumers will continue to demand a mix of all vehicle sizes, and that the marketplace will assure that such a mix continues to be supplied.

Even so, market segment standards could be combined with a "floor" standard and/or with market-based incentives to stimulate consumer demand for fuel-efficient vehicles, thus employing both a "carrot and stick" approach. A credit scheme could also be devised to help restrain overall vehicle size growth.

PART II. INFORMATION IN RESPONSE TO COMMITTEE STAFF QUESTIONS

A. DETERMINING MAXIMUM FEASIBLE MPG

Nissan agrees that all of the assumptions described in S. 341 and addressed individually below are essential in order to make a valid appraisal of maximum feasible average fuel economy. We also have the following points to make on individual assumptions.

Technology Assumption:

The Committee requested information on technologies that are capable of being commercialized in the near and long term. Most of the proven fuel efficient technologies were already adopted into Nissan's fleet by 1990, thus limiting our improvement potential in the near term. Further adoption of technologies whose penetration is relatively low (e.g., roller rocker arms for OHC engines, variable valve timing control) is also planned. However, employing some of those technologies will require major changes in our manufacturing facilities, so that substantial lead time will be needed to implement the changes.

Nissan has research efforts underway to develop certain types of new technologies for use in vehicles after the year 2000. Specifically, we are working to develop promising modifications of gasoline-powered engines (for example, lean-burn, stratified intake, etc.). There is still considerable work to be done before wide-scale usage of these engines is feasible, such as assurance of their driving and exhaust emission performance.

We also have research devoted to alternative fuels, such as methanol, compressed natural gas, electric power, and hydrogen. There are as-yet unresolved technical issues associated with the successful introduction of these technologies (such as driving range and fuel safety). They also hold important infrastructure implications.

In the meantime, our efforts will focus on improvements to current engines and vehicles. But the opportunities for improvement are incremental in nature, since the large gains have already been made. We are concentrating our efforts to achieve improvements in the following areas:

- Variable valve lift
- Higher compression ratio
- Improved control systems for combustion, EGR, etc.
- Increased number of gears (such as 5-speed automatic transmission, continuously variable transmission)
- Reduced tire rolling resistance
- Reduced friction (piston rings, transmission, oil, etc.)
- Reduced aerodynamic resistance
- Higher efficiency for accessory components
- Weight reduction (for all parts) -- such as streamlining component designs to reduce the number of parts, thinning, hollowing, adopting new materials, etc.

In Nissan's view, the total fuel economy benefit that we can reasonably expect to achieve using all of these methods, taking into account the offsetting effects of new environmental and safety requirements, is significantly less than would be required to meet new fuel economy standards that have been proposed in S. 279.

Performance Assumption: Like most vehicles produced by Asian manufacturers, Nissan's products have increased in average performance levels in recent years. Most Asian imported autos had lower than average performance in the past. Their performance is now compatible with the fleet average.

Nissan's trend toward higher performance levels has been part of an overall trend, as our vehicles have entered the "mainstream" of the United States auto market. At the same time, we are striving to offer our customers the best balance of performance, fuel economy and other attributes. This is especially true in the years 1988-90, when our Corporate Average Fuel Economy declined slightly but when, on a model-by-model basis, improvements in fuel economy and performance were achieved simultaneously. (See Attachment 4.) These seemingly incompatible improvements were possible through the use of advanced technology.

Size Assumption: Data compiled by DOE's Oak Ridge National Laboratory (see Attachment 3) demonstrates the remarkable stability of average interior volume over time. We would not expect significant changes in this trend in the near future for any reason, unless exceedingly restrictive CAFE standards are enacted by Congress.

Emissions Assumption: Nissan cannot predict what impact the Tier II Clean Air Act tailpipe emission standards will have on our fleet fuel economy, because at present time we do not know what technology will be required to meet those significantly lower standards. A substantial portion of our engineering manpower and resources is currently assigned to the task of ensuring compliance with Tier I standards. Therefore, we do not have information which would be helpful in quantifying the fuel economy relationship between Tier I and Tier II standards.

Safety Assumption: Nissan believes it is possible to produce small cars with excellent levels of safety performance, and this belief has always been central to our design philosophy.

The relationship between performance levels and safety is not straightforward. Many drivers perceive their vehicle's acceleration performance as a safety benefit, permitting safe merging into 65-mph expressway traffic, for example.

Nissan is committed to offering enhanced safety features such as air bags and anti-lock brakes across our product line, including on our higher performance and smaller vehicles. And all of our vehicles are designed in full compliance with federal safety requirements.

Cost-Effectiveness Assumption: As stated previously, S. 341 is an improvement over S. 279 in that it specifies important assumptions to be considered in determining maximum feasible fuel economy. However, Nissan would favor the inclusion of an explicit cost-effectiveness assumption in the list of assumptions for determining the maximum feasible average fuel economy.

The Motor Vehicle Information & Cost-Savings Act already requires the Secretary of Transportation to take into account "economic practicability" when considering the level of the standards. A cost-effectiveness assumption will further require the Secretary to take into consideration what may happen in the market absent a rise in gasoline prices. The higher cost of fuel efficient technology may not represent perceived value to the customer -- or more efficient cars may simply encourage people to drive more. CAFE standards that are not cost-effective may put manufacturers in conflict with their customers, slow down the turnover of the fleet, and frustrate our energy conservation objectives.

It should be noted that the differential standards approach embodied in S. 341 makes comparisons of "cost-effectiveness" across the industry extremely subjective. For example, a company with a high penetration of advanced fuel-saving technology has fewer cost-effective options to improve fuel economy than a manufacturer that has not yet diffused most technology into its fleet.

Lead Time Assumption: Nissan would favor moving the effective date of the first tier of additional fuel economy requirements to 1997 model year or later. It takes about seven years to turn over our current model lineup with new models incorporating the technologies that are now under development at Nissan. This amount of time will permit more orderly planning for new fuel economy requirements.

B. TRANSLATING MAXIMUM FEASIBLE AVERAGE FUEL ECONOMY INTO MANUFACTURER-SPECIFIC STANDARDS

As previously noted, the uniform percentage increase approach does not provide a mechanism for equitable treatment of new market entrants and thus provides incentives for "gaming." These types of strategies do not produce fuel economy benefits. Due to the inherent flaws in the percentage improvement approach, the approach cannot be "fixed." So long as different standards are applied to individual companies, there would always be an incentive for someone to sell as many vehicles as possible under less stringent standards.

The logical way to set standards for new entrants under a percentage improvement approach, in an attempt to avoid the above pitfalls, would be to examine the type of vehicle to be offered by the entrant and set the entrant's standard at the average fuel economy of vehicles in the same class. Of course, this is exactly the way standards would be set under the size class based approach, and provides a compelling argument for establishing a size class based program in the first place.

C. LEGISLATIVE VS. ADMINISTRATIVE DECISION-MAKING

Nissan supports the general approach adopted in S. 341 for standard-setting. We believe that the process will work best if Congress establishes relatively detailed criteria and articulates policy judgments to be applied in the standard-setting rulemaking, and DOT is allowed to perform the detailed technical analysis.

The analysis required to determine maximum feasible average fuel economy is highly complex. The final conclusions depend on detailed technical and economic judgments, as well as the initial assumptions on vehicle size, performance, etc. We believe that DOT has the appropriate expertise to minimize the risks associated with setting inappropriate standards, and is capable of objectively determining future regulatory requirements for the motor vehicle industry. After DOT has completed its initial analysis, it can be subjected to public scrutiny during the rulemaking process.

In this way, all interested parties will have the opportunity to critique the technical and economic judgments made by DOT.

D. CAFE CREDIT TRADING

As mentioned previously, Nissan favors the expanded use of credits (such as between segments and between domestic/import categories, etc.) provided for in S. 341. However, the credits scheme proposed is insufficient to mitigate the anti-competitive effects of different standards for each manufacturer. We would favor incorporating this credit scheme into the alternative approach that we have suggested.

Two-Fleet Requirement: The current separate requirements for domestic and import fleets of the same manufacturer does have the potential to perversely affect sourcing decisions, by providing a disincentive to foreign-based U.S. manufacturers to maximize U.S. content. (Since Nissan imports Sentras at the same time that it produces Sentras in the United States, and the local content of the model line for purposes of CAFE is a product of the average between the two, we have not thus far been constrained by the two-fleet requirement.)

While the credit trading scheme provided for in S. 341 "implicitly" repeals the two-fleet domestic/import requirements that exist in current law, we believe our alternative approach provides a more fail-safe method of dealing with the two fleets. Under a market segment approach, the need for a two-fleet requirement is greatly reduced. Unlike the situation under the current "single number" standard, there would be little, if any, compliance benefit resulting from shifting production of small, fuel efficient vehicles out of the United States, for example. Such vehicles would be subject to a stringent, small vehicle standard, and would not be averaged together with larger vehicles. With other approaches, particularly in the absence of the Committee's proposed credit trading scheme, the effect of a vehicle changing from one fleet to another could jeopardize compliance with CAFE. We therefore believe that size or class based standards offer a preferable means of dealing with the two-fleet requirement than do percentage increase based standards.

E. NEW FEE STRUCTURE

Although Nissan has always been in compliance with CAFE, to a large degree compliance is related to marketplace demand and thus is beyond the full control of manufacturers. We would note that the potential influence of marketplace demand on a manufacturer's compliance status is minimized under our proposed market segment-based approach.

F. ALTERNATIVE FUEL CREDITS

Nissan favors the elimination of the cap which currently exists on the CAFE credit available for flexible fueled vehicles. This is consistent with the President's stated objective in the National Energy Strategy, and a similar amendment to S. 1224 was supported in a floor vote in the Senate last fall. If the stated objective is encouraging non-petroleum fuel usage, flexible fueled vehicles are an important transitional tool in moving the market towards that goal.

G. MARKET BASED INCENTIVES

Nissan continues to believe that to achieve energy conservation from the transportation sector, changes in consumer behavior are a necessary complement to higher fuel economy standards. We suggest that the Committee could enhance the potential impact of its transportation efficiency program by including market incentives such as gas guzzler/gas sipper fee/rebate programs.

ATTACH. 1: Nissan's Penetration of Technologies to Improve Fuel Economy (Passenger Vehicles)

TECHNOLOGIES TO IMPROVE FUEL ECONOMY	% PENETRATION							
	US MARKET AVERAGE (by OTA)	NISSAN						
	'87	'85	'86	'87	'88	'89	'90	'91
OVERHEAD CAM ENGINE	40.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MULTI VALVE (Including 3- & 4-valve)	5.0	0.0	0.0	2.2	3.7	71.3	75.9	76.4
FRONT WHEEL DRIVE	78.0	75.6	74.2	91.1	91.3	84.7	75.4	78.3
ROLLER CAM:	40.0	0.0	0.0	0.0	0.0	0.0	2.4	4.9
In OHV Engine (Tappets)	36	-----	-----	-----	-----	-----	-----	-----
In OHC Engine (Tappets or Rocker Arms)	4	0.0	0.0	0.0	0.0	0.0	2.4	4.9
VALVE TIMING CONTROL	N/A	0.0	0.0	0.0	0.0	0.0	8.9	40.0
FUEL INJECTION:	76.0	50.3	53.6	59.8	99.5	99.3	100.0	100.0
Throttle Body Injection	31.0	0.0	0.0	12.3	63.9	56.8	33.5	0.4
Multi Point Injection	45.0	50.3	53.6	47.4	35.5	42.5	66.5	99.6
4-SPEED AUTOMATIC TRANSMISSION	35.0	22.3 (45.8)	31.1 (65.8)	32.2 (59.2)	23.6 (46.3)	29.1 (52.1)	47.0 (78.7)	59.9 (90.0)
ELECTRONIC TRANSMISSION CONTROL	2.0	5.2 (10.6)	5.4 (11.4)	2.0 (3.7)	2.7 (5.2)	24.5 (43.8)	34.4 (57.5)	33.6 (50.4)
TORQUE CONVERTER LOCK-UP	N/A	47.9 (98.4)	47.2 (100.0.)	54.5 (100.0)	50.9 (100.0)	55.9 (100.0)	61.6 (100.0)	61.6 (100.0)

NOTES: Figures in parentheses show penetrations within A/T class.

ATTACHMENT 2

MARKET SEGMENT CLASSES

PASSENGER CARS

Minicompact
Subcompact
Sports
Compact
Mid Size
Large
Premium

LIGHT TRUCKS

Small Pickup
Large Pickup
Small Van
Large Van
Small Special Purpose Vehicle
Large Special Purpose Vehicle

ATTACHMENT 3
DATA FROM, OAK RIDGE NATIONAL LABORATORY, "LIGHT DUTY VEHICLE SUMMARY: FIRST SIX MONTHS OF MODEL YEAR 1990" (ORNL-6626/SI)

Table 16

Sales-Weighted *Interior Space of New Domestic and Import Automobiles* by Size Class
(cubic feet)

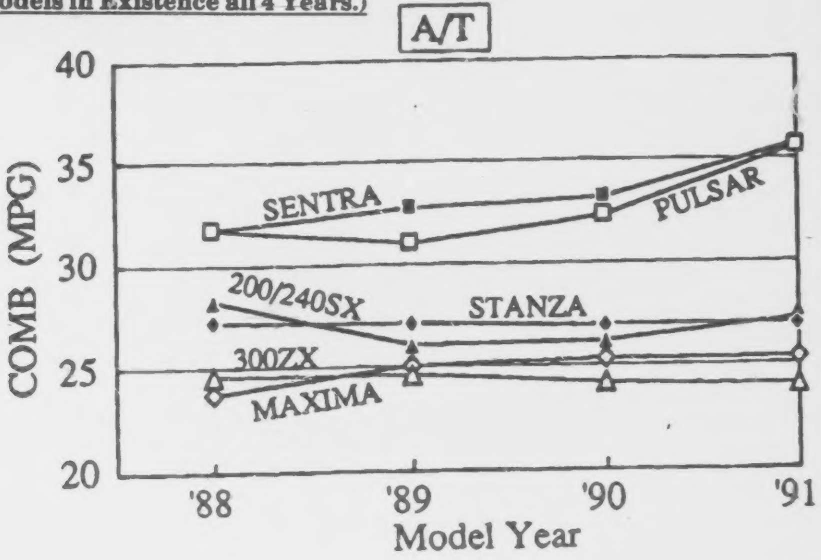
Model year	Minicompact (< 85)	Subcompact (85-99)	Compact (100-109)	Midsize (110-119)	Large (> 120)	Two seater[a]	Fleet
76[b]							
77	78.8	89.8	107.1	113.0	128.0		107.9
78	79.4	89.8	105.3	112.9	128.5		107.9
79	80.0	90.2	105.8	113.4	130.1		106.9
80	82.4	89.9	105.4	113.5	130.8		104.9
81	83.3	90.2	103.6	113.7	130.6		105.5
82	83.1	91.3	102.9	113.9	130.4		106.0
83	82.7	93.3	103.0	113.1	131.3		107.3
84	77.0	93.8	103.0	113.3	130.7		108.0
85	77.8	94.1	103.1	113.5	129.7		107.9
86	80.1	94.5	102.8	113.8	127.6		107.0
87	81.6	93.1	103.0	113.9	127.5		106.9
88	81.0	93.5	103.3	113.6	127.2		107.0
89	75.0	93.3	102.7	113.8	127.4		107.5
90[c]	80.4	94.3	103.1	113.8	127.9		107.4

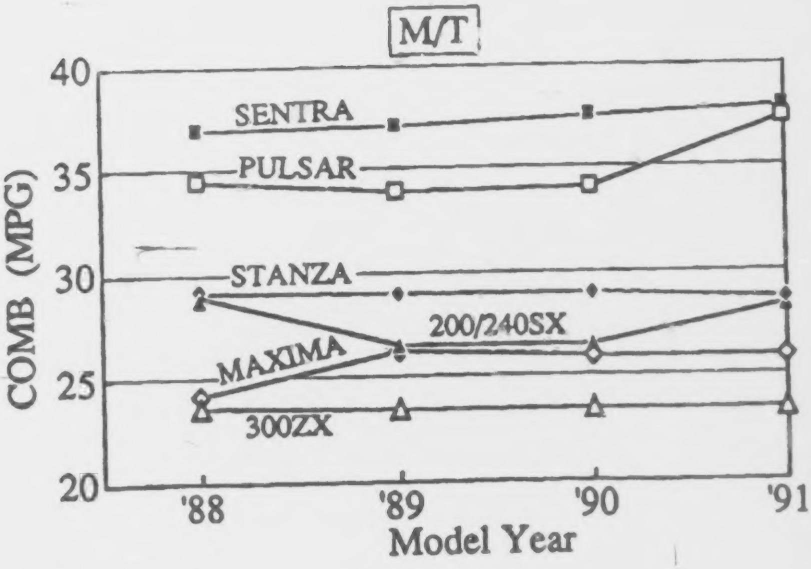
[a] Interior volumes of two seaters are not reported to EPA.

[b] Data not available.

[c] Represents sales for the first six months of model year 1990 (October through March).

ATTACHMENT 4
1988-91 Nissan Combined Fuel Economy Values
(for Models in Existence all 4 Years.)





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